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ABSTRACT

Aboriginal educators and economic development practitioners in Canada are developing and implementing initiatives to promote the achievement of "digital opportunities" so that Aboriginal communities can both develop and be in a position to take advantage of economic opportunities without falling deeper into the "digital divide." Asynchronous and synchronous technologies assist Aboriginal peoples in addressing these four objectives: (1) to create employment and economic development opportunities; (2) to promote the acquisition of knowledge and development of essential skills and attitudes in order for individuals to become self-sufficient, valued and contributing members of their knowledge community; (3) to preserve language and culture and to exchange with other cultures; and (4) to enable Aboriginal people to participate in the knowledge and information technology economy. Despite barriers such as limited financial resources, insufficient human and technological resources, insufficient technological infrastructures, geographic isolation, and limited control over education and training programming and delivery, common success factors among Aboriginal peoples are as follows: (1) healthy communities supported by creative, consistent, and visionary leadership; (2) solid technology strategies and enabling infrastructures; (3) strong human resources and technical capabilities; (4) technology skills as foundation skills; and (5) strategies that bridge traditions with training. (Includes 5 exhibits; 48 references; and an appendix with the results of several case studies.) (MO)

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ABORIGINAL DIGITAL OPPORTUNITIES:

Addressing Aboriginal Learning Needs Through the Use of Learning Technologies

328-01 Detailed Findings • By David Greenall and Stelios Loizides

HIGHLIGHTS

- Learning technologies can promote the development of essential skills, create employment and economic development opportunities, and enable Aboriginal peoples to participate in the knowledge economy.

- Learning technologies alone cannot address the serious social and economic challenges that many Aboriginal communities face. They represent one piece of the puzzle; coming up with effective solutions to complex problems will require holistic and coordinated approaches on the part of all community stakeholders.

- It is critical that Aboriginal communities continue to explore ways of adopting and using learning technologies to avoid falling deeper into the "digital divide."

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The Conference Board of Canada is an independent, not-for-profit research organization with affiliates in the United States and Europe. Our mission is to help our members anticipate and respond to the increasingly changing global economy. We do this through the development and exchange of knowledge about organizational strategies and practices, emerging economic and social trends and key public policy issues. Since 1954, the Board has been committed to researching innovative practices, designing new strategies and providing our members with the most up-to-date information, analysis and expertise to help them excel in Canada and around the world.

About the Canadian Centre for Business in the Community

The CCBC provides the plan and the tools that Canadian companies need to develop effective corporate citizenship programs that balance business objectives and the needs of the community. The Centre has expertise and services in the areas of corporate responsibility and ethics, partnership building, corporate community investment, community economic development, and corporate–Aboriginal relations.

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We would like to thank Human Resources Development Canada's Office of Learning Technologies for its financial sponsorship. The Conference Board gratefully acknowledges its contribution. Special thanks to the various individuals within the federal and provincial governments, as well as national Aboriginal organizations that helped to identify the communities profiled in this report.

We greatly appreciate the efforts of our primary partners in this project, Canada's Aboriginal and First Nations communities. Their willingness to allow us to come into their homes and engage in meaningful dialogue enabled the research team to identify the critical issues facing Aboriginal peoples' use of learning technologies. It is the authors' hope that the research results will assist in the process of developing strategies and implementing solutions and will enhance education, employment and enterprise opportunities for Canada's Aboriginal peoples.

A Conference Board of Canada publication from The Canadian Centre for Business in the Community

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EXECUTIVE SUMMARY

ABORIGINAL DIGITAL OPPORTUNITIES

Addressing Aboriginal Learning Needs Through the Use of Learning Technologies

328-01 Detailed Findings • By David Greenall and Stelios Loizides

"Aboriginal communities find themselves in an interesting situation. With respect to the digital era, they are...at the starting gate with all sectors of Canadian society. [Aboriginal peoples] also perhaps stand to benefit the most from the digital era."

(Shirley Serafini, Deputy Minister, Indian and Northern Affairs, 2000)

Aboriginal communities are embracing the potential of technologies for learning so members can both develop and be in a position to take advantage of economic opportunities. Aboriginal educators and economic development practitioners are developing and implementing creative and innovative initiatives to promote the achievement of Aboriginal "digital opportunities." It is critical that Aboriginal communities continue to explore ways of adopting and using learning technologies to avoid falling deeper into the "digital divide."

Aboriginal peoples are using asynchronous technologies such as self-directed computer and Web-based training, electronic conferencing, bulletin boards and e-mail. They are using synchronous technologies such as video teleconferencing and chat rooms. These technologies are assisting Aboriginal peoples to address several objectives:

- To create employment and economic development opportunities
- To promote the acquisition of knowledge and development of essential skills and attitudes in order for individuals to become self-sufficient, valued and contributing members of their knowledge community
- To preserve language and culture and to exchange with other cultures
- To enable Aboriginal people to participate in the knowledge and information technology economy

As Canada's economy becomes knowledge-intense, there is significant danger that underskilled Aboriginal people will be excluded from new economic opportunities and will be pushed to the margins of society. Challenges affecting communities' abilities to take advantage of their wealth and employment-creating opportunities include limited financial resources, insufficient human and technical resources, geographic isolation, insufficient technological infrastructures, and limited control over education and training programming and delivery.

Benefits

- ✓ Access to computers and technology has given Aboriginal people opportunities to enhance their skills and improve employment prospects.
- ✓ Learning opportunities offered by technology help to address the different ways in which students learn.
- ✓ Technology provides communities with access to information and helps to overcome the challenge of spatial dispersion.
- ✓ Distance-based learning technologies allow students to receive quality instruction in their communities and to complete high school.
- ✓ Aboriginal communities emphasize this point: technology needs to support and enhance Aboriginal traditions, values and practices. Increased local control of education and training delivery can help to ensure that technology programs and educational standards are relevant to local learner needs and that they contribute to the achievement of local community digital opportunities.

Despite these barriers, Aboriginal peoples are achieving successes. Common success factors are:

- healthy communities, supported by creative, consistent and visionary leadership;
- solid technology strategies and enabling infrastructures;
- strong human resources and technical capabilities;
- technology skill as a foundation skill; and
- strategies that bridge traditions with training.

Aboriginal communities are looking forward and developing innovative solutions to existing challenges. Key areas of focus include infrastructure investment and upgrading, strengthening of human resources and technological capabilities, use of technology to maximize education and training delivery, exchange of information with other Aboriginal communities, and building of partnerships with government and the private sector.

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Aboriginal peoples are increasingly participating in the global economy. Building technological skills and competencies is key to education, employment and enterprise. To leverage and maximize these skills, communities need help and support. As a next step, a coordinated effort is needed to facilitate the process of matching needs with options and solutions by bringing government, business and Aboriginal leaders together. Doing so will help Aboriginal communities to develop the capacity to meet the skill and labour needs of the Canadian economy and continue movement towards economic self-sufficiency.

> *"With appropriate programs and investment, Aboriginal youth can take advantage of opportunities and participate much more fully in the benefits of a modern knowledge-based economy than their preceding cohorts."*
>
> (Advisory Council on Science and Technology, 1999)

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Aboriginal Digital Opportunities

Aboriginal communities are seeking to develop the skills and competencies necessary to participate in the labour market.[1] Educators and economic development officers are integrating technology into education and skills training strategies in an attempt to foster individual and community self-reliance. For Aboriginal peoples, technology is both present and future. They are building technological capabilities so members can take advantage of existing opportunities while looking forward to the development of new economic possibilities.

The challenges and barriers facing Aboriginal peoples in achieving these opportunities are significant. Finances, technological infrastructure, teacher training and community social problems are a few of the challenges that constrain communities' potential. Aboriginal peoples are looking for help in addressing these challenges and moving forward.

Learning technologies alone cannot address the serious social and economic challenges that many Aboriginal communities face. They represent one piece of the puzzle; coming up with effective solutions to complex problems will require holistic and coordinated approaches on the part of all community stakeholders.

This report is the result of a research study conducted by The Conference Board of Canada with support from Human Resources Development Canada's Office of Learning Technology. The purpose of the report is to identify the issues and challenges faced by Aboriginal communities when using learning technologies for education and skills development and the approaches they are adopting to develop digital opportunities.[2]

The report is targeted primarily at Aboriginal communities that are looking for ways to implement learning technologies in their schools, as well as communities that already have technology in the classroom but are seeking to learn from the experiences of others. Case study examples of learning technology initiatives provide valuable insight into the actual experiences of Aboriginal communities.

Communities selected represent a cross-section of Aboriginal communities ranging from urban to rural and from north to south. Aboriginal contacts in government and the Aboriginal communities were identified during the literature review phase of the study. Aboriginal, education, government and private sector representatives helped to identify potential communities, which were then invited to participate. It is important to note that Aboriginal peoples were consulted throughout the research process and that selection of communities was determined through these consultations.

Research Methodology

The Conference Board of Canada, as part of its ongoing Aboriginal research and networking program, undertook a study of Aboriginal learning technology initiatives with support from Human Resources Development Canada's Office of Learning Technologies. The research methodology included a review of the literature on learning technology in general and its impact on Aboriginal learners specifically, as well as case study analyses of 10 Aboriginal communities across Canada.

Tobique First Nation—New Brunswick

Kativik School Board—Quebec

Fort Albany and Kashechewan First Nations—Ontario

Nisichawayasihk Cree Nation—Manitoba

Meadow Lake Tribal Council—Saskatchewan

Montana First Nation—Alberta

Musqueam First Nation—British Columbia

Haines Junction and Champagne and Aisihik First Nation—Yukon

Kwanlin Dun First Nation—Yukon

Sahtu Divisional Education Council—NWT

Community case studies are included in the Appendix to this report. The authors have considerable knowledge and experience in the areas of Aboriginal education and corporate–Aboriginal relations; however, they are not members of Canada's Aboriginal communities and acknowledge the sensitivities involved in conducting research involving other cultures. For this reason, a participatory research approach was employed, with community identification, findings and case studies reviewed by community representatives to ensure accuracy and credibility.

Objectives of the Study

- ✓ Identify technologies being used, why and how.
- ✓ Examine the role that technologies play in education and skills training strategies.
- ✓ Outline the obstacles impeding Aboriginal peoples' efforts to leverage the benefits of learning technologies.
- ✓ Highlight innovative solutions being considered and pursued by Aboriginal communities.
- ✓ Provide a guiding reference for Aboriginal communities to adapt to their own circumstances when considering how to use technology for learning.

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Research by The Conference Board of Canada indicates that Aboriginal peoples continue to have lower rates of participation in the labour force than the general population.[3] This research also demonstrates a gap between the current levels of education and skills of Aboriginal people and the education and skill requirements of the economy. This report builds upon and takes the research a step further by examining how Aboriginal learning technology development can bridge the gap.

What Is a "Digital Opportunity"?

This refers to an economic development, cultural empowerment and/or community sustainability benefit resulting from the implementation and application of information and communication technologies (ICT) to education and skills training initiatives.

Assumptions

Three assumptions underlie the scope and content of this report. The *first* is that, with regard to Aboriginal learners in particular, there is no clear consensus on the effectiveness of technology in the classroom. Studies exist that both support and criticize technology adoption and use. This report was prepared under the assumption that Aboriginal communities, like other communities, are seeking to realize the maximum potential of technology and have both positive and negative experiences.

The *second* assumption is that Aboriginal learners have unique cultural needs. Technology has the potential to significantly affect Aboriginal values, cultural traditions and language, and the protection of their culture is a critical issue for Aboriginal communities. This report identifies Aboriginal perspectives on the interaction between technology and culture and examines how the challenge is being dealt with.

The *third* assumption is that each Aboriginal community is unique. Differences include stage of economic development, geographic location, history, level of technology adoption and level of community responsibility for education programming. For example, geographic location affects the ability of communities to implement technologies in a cost-effective manner. Likewise, differences in provincial educational systems affect the ability of communities to influence how technology is used in their schools. Although these differences exist, this report assumes that there are common elements within all communities that can be identified as "good practices" in the adoption and use of learning technologies.

Report Framework

The report is divided into four chapters. *Chapter 1* examines the "whys" and "whats" of learning technologies: why they are becoming increasingly important, what the perceived benefits are for education and skills training, and what initiatives are being taken to address Aboriginal peoples' needs at national and international levels.

Chapter 2 looks at the specifics of learning technology implementation and application in Aboriginal communities. This section provides an in-depth view of the issues and challenges and the steps that are being taken to address them. It provides an overview of the types of learning technologies that are being used, the barriers to effective learning technology use, and the plans communities have for creating solutions and opportunities in the future.

Chapter 3 outlines options and concrete steps for investment, partnerships and other follow-up opportunities as identified by Aboriginal representatives.

Chapter 4 contains a learning technology planning tool, the Aboriginal Learning Technology Decision-Making Framework, which is derived from the "good-practice" experiences of interviewed community representatives. This culturally appropriate tool is intended as a reference for Aboriginal communities considering how to integrate and apply technology within their education and training programs.

Report Audiences

This report is intended to address the interests of three main audiences:

- *Aboriginal communities:* The primary audience for this report, Aboriginal communities, organizations and individuals, can learn from the experiences of other Aboriginal communities. Building on the experiences and insights of profiled communities can help other communities to adopt and use learning technologies effectively to improve education and promote economic development and cultural enhancement. Communities seeking to learn from others' experiences can also use the culturally appropriate good-practice planning tool to develop and implement strategies for using technologies within education and training.
- *Public sector decision makers*: To provide a baseline of knowledge to assist policy and program development, implementation and assessment, this report outlines the state of practice among Aboriginal communities as represented by 10 profiled Aboriginal communities. The report offers valuable insight into what these communities are doing with technology, where they are planning to focus future efforts and

Aboriginal learners have unique cultural needs.

which challenges stand to benefit most from appropriate public policy responses.

- *Private sector representatives*: Companies are looking for ways to develop innovative and productive partnerships with Aboriginal communities as part of corporate citizenship initiatives as well as to address strategic operational concerns such as availability of local skilled labour and technical support services. By bringing forth the issues and challenges that Aboriginal communities are looking to address, this report will assist companies in making decisions about where support can be most effectively directed.

1 According to Section 35(2) of the Constitution, Aboriginal peoples include Indian, Inuit and Metis peoples. Statistics for Aboriginal peoples as a whole are used whenever possible; however, in some instances, data for certain Aboriginal groups are not available. These limitations are highlighted where necessary.

2 This report examines learning technologies used in Aboriginal education and skills training; it does not extend to their use and application in the workplace.

3 See, for example, Stelios Loizides and Janusz Zieminski, *Employment Prospects for Aboriginal People* (Ottawa: The Conference Board of Canada, 1998), and *Performance and Potential 2000–2001: Seeking "Made in Canada" Solutions* (Ottawa: The Conference Board of Canada).

The Context for Aboriginal Use of Learning Technologies

KEY FINDINGS

Demographic pressures underscore the need of Aboriginal communities to develop skilled workers in order to meet Canada's labour market needs and to improve their employment prospects.

The emergence of an economy that values technological skills and competencies has significant positive and negative implications for Aboriginal peoples.

Technologically skilled Aboriginal workers will be required to meet the needs of land claim settlements and self-government arrangements.

Technology provides Aboriginal teachers and students with a tool to broaden their learning experience.

What Are Learning Technologies?

Learning technologies are electronic information and communication technologies (ICT) that deliver learning, knowledge and skills on a one-way or two-way basis.

Asynchronous technologies: These allow learners to access information at different points in time and at their convenience. Interactivity is limited.

- E-mail
- Self-directed learning applications available on:
  - — digital video disk (DVD)
  - — CD-ROM
  - — audio/visual
  - — film
  - — video

Synchronous technologies: Learning takes place for all students at the same time through real-time information exchange and interaction. These are highly interactive.

- Satellite broadcast
- Video teleconferencing
- Internet conferencing
- Chat rooms

Who Can Use Learning Technologies?

- ✓ Youth
- ✓ Adult learners
- ✓ Elders
- ✓ Educators
- ✓ Skills trainers
- ✓ Community economic development officers

Aboriginal communities are using all of these learning technologies to varying degrees. Application of technologies is dependent on such factors as geographic location, learner needs, financial resources, infrastructure capability and level of teachers' technical sophistication.

"Learning technologies are an education tool that enables Aboriginal people to get out there and stand on their own. Aboriginal youth are realizing the benefits of computers and the opportunities in the new economy. They are finding the technology challenging, but you can see the dedication of students in trying to improve themselves...for a better future."

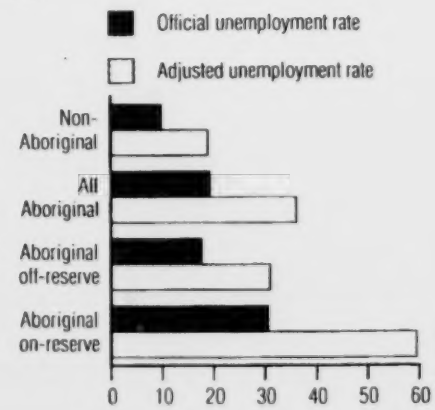
(Aboriginal educator)

Canada's Aboriginal Context

The Socio-economic Situation

Aboriginal people experience much lower rates of labour force participation than the average Canadian and are more likely to be employed at the lower skill end of the labour market or to be unemployed (Chart 1). This situation carries heavy social and economic costs.[1]

Chart 1
Unemployment Rates
(percentage)



Source: The Conference Board of Canada.

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As a group, Aboriginal people also are more likely to have lower levels of educational participation and achievement. High dropout rates contribute to the low proportion of on-reserve registered Indian population with at least a high-school education, with the result that there is less opportunity to develop the types of skills and attributes that employers are increasingly seeking (Table 1). Moreover, the scarcity of employment and business opportunities in most Aboriginal communities implies the need to create their own opportunities and to develop competencies that are competitive in the broader economy.

Table 1

	Registered Indians	All Canadians
	percentage	
Students eligible to attend elementary and secondary schools who are not enrolled	20	n/a
Dropout rate before completion of Grade 9	18	3
Youth between 18 and 20 who have left school	40	16
Youth between 18 and 20 who have graduated	30	63
Population with at least high-school education	37	65

Source: Indian and Northern Affairs Canada and Sub-Commitee on Aboriginal Education, 1998.

Demographics: An Aboriginal "Baby Boom"

The Aboriginal population is the fastest growing segment of Canadian society. In 1996, children under the age of 15 accounted for 35 per cent of all Aboriginal people, compared to 20 per cent for Canada's total population. By 2006, the Aboriginal working age population is projected to increase by around 300,000 to reach 920,000.[2] The importance of Aboriginal youth having technical skills and competencies is evident: a large number of them will enter the labour market in a relatively short period of time. This will be especially significant in Manitoba and Saskatchewan, with their large Aboriginal populations. Those possessing skills in demand will be in a good position to take advantage of economic opportunity; those without these skills are likely to face disadvantage and social exclusion.

Aboriginal People as a Solution for Canada's Emerging Human Capital Gap

A projected shortage of 950,000 workers in Canada's labour force by 2010 will have major economic productivity and competitiveness implications.[3] The Conference Board has identified this impending labour deficit as a critical issue. Strategies to address this gap include:

- increasing the level of labour productivity of the existing workforce through capital and education investments;
- bringing in skilled immigrant workers to meet demand; and
- developing the skills and knowledge base of underutilized segments of the workforce to meet demand.

Aboriginal peoples represent a critical potential resource for deepening the talent pool and meeting the labour needs of the future. A large cohort of Aboriginal youth will enter the workforce at almost the same time as the projected shortage of overall labour. Business has a direct interest in building a pool of competent and available labour; otherwise, competitiveness and productivity may suffer. At the Conference Board's 1999 CEO Forum on Aboriginal Issues, the training and education of Aboriginal people were identified as key challenges in meeting the labour needs of business.

The public sector also has an interest in maintaining and enhancing the competitiveness of domestic industry through the fostering of a supply of skilled workers. The retirement of non-Aboriginal baby-boom workers from the labour force will put additional pressure on governments' ability to pay for social programs. Maximizing Aboriginal employment will address future labour shortages while increasing the revenue to ensure the sustainability of pension and employment insurance programs.

Impact of Macro-economic Changes: Globalization of Markets and Information Exchange Mechanisms

Liberalization of markets and loosening of trade barriers, coupled with improved access to cost-effective communications and information exchange technologies, have profound implications for Aboriginal economic opportunities. As labour and capital become more mobile, there is increased competition for skilled people among countries and across Canada's regions. Aboriginal people need skills to compete not just with other Canadians but increasingly with other people around the world. These changes also open up possibilities for Aboriginal communities. Remote communities with strong infrastructures and technical skills and competencies can now compete for information-based work in a global network. Aboriginal entrepreneurs can tap into global markets and compete directly with domestic and foreign businesses. As *The Economist* has noted, *"[The Internet] operates 24 hours a day, and it does*

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not just offer you a window on the world, but a way of playing a part wherever you are."[4]

Emergence of the Knowledge Economy

Education and skills training strategies need to be aligned with the requirements of employers. As the knowledge and industrial economies merge, employers are increasingly seeking individuals with a mix of fundamental/essential, personal management, technical, leadership, contextual and teamwork skills who can operate in rapidly changing business environments. Research indicates that while technological competencies are important, they are regarded as only one part of the skills and competencies equation.[5] As the Conference Board's *Employability Skills 2000+* (Exhibit 1) illustrates, individuals must also be able to think creatively and strategically, work in teams, and undertake collaborative decision making.

Dealing with the Digital Divide

There is a significant danger that Aboriginal peoples will be left behind and disenfranchised as the pace of technology adoption and integration in the economy increases. Canada's Aboriginal peoples face many of the same issues and challenges discussed in debates surrounding information "haves" and "have-nots" in the developing world (Exhibits 2 and 3).

With knowledge generation increasingly tied to wealth creation, communities with unskilled labour and insufficient technological infrastructure will be challenged to match the rate of development in society as a whole. The challenge will be to develop strategies that build Canada's overall level of technological development and competitiveness, create an equitable distribution of economic benefits across all regions, and avoid the creation of a technology and information elite.

"What appears to be emerging is a highly educated, mobile, internationally networked cohort of knowledge workers on the one hand and a relatively unskilled, immobile class of workers who bear most of the costs of the new global order on the other. This is not the Canadian way."

(Thomas J. Courchene, *A State of Minds: Canadians in the Information Era*, working paper 10, 2000)

Aboriginal youth will be challenged to develop skills that are not only required in the marketplace but can also compete with the expertise of their non-Aboriginal counterparts. Unlike previous generations, today's youth have grown up immersed in technology and have internalized it. Technology is not an "add-on" skill as for previous generations. Rather, youth are technologically proficient and ready to exploit their own digital opportunities. Aboriginal students will need equivalent levels of technological competency to match them in the labour market.

"We as a society cannot afford further divisions between the information haves and have-nots. A gap in the availability of Internet access will have a multiplier effect and create an even more significant divide in critical areas such as education, job training, literacy, public health and economic prosperity."

(Tim Koogle, Chairman and CEO of Yahoo! G-8 Kyushu-Okinawa Summit 2000)

Taking Back Responsibility: Community Delivery of Education and Training Programming

Over the past two decades, devolution and transfer-of-authority arrangements have given Aboriginal peoples more control over how education and skills training are delivered in their communities. While authority over education is not complete, 466 schools were under First Nations management by 1998.[6] *Gathering Strength*, the Government of Canada's action plan to implement the recommendations of the Royal Commission on Aboriginal Peoples (RCAP, 1996), emphasized the importance of investing in the acquisition of the education, skills and training necessary for individual self-reliance.[7] The action plan identifies greater access to technology for Aboriginal schools as a primary means of enhancing learning. Initiatives such as Industry Canada's Native SchoolNet and Community Access Program (CAP) centres represent an initial response to this challenge.

Aboriginal youth will be challenged to develop skills that are competitive in the marketplace.

The Aboriginal Human Resources Development Strategy gives communities greater responsibility and access to resources for education programming and training delivery. There is more local administrative control, input regarding educational content, and decision-making ability about how technology can be best applied to meet learners' needs. While communities will increasingly take the lead in delivering these programs, they will also require ongoing support. As the claim settlement examples

Exhibit 1
Employability Skills

Employability Skills 2000+ has been endorsed by all the member organizations of the Employability Skills and Science Forums

The skills you need to enter, stay in and progress in the world of work—whether you work on your own or as a part of a team.

These skills can also be applied and used beyond the workplace in a range of daily activities.

Fundamental Skills
The skills needed as a base for further development

You will be better prepared to progress in the world of work when you can:

Communicate
- read and understand information presented in a variety of forms (e.g., words, graphs, charts, diagrams)
- write and speak so others pay attention and understand
- listen and ask questions to understand and appreciate the points of view of others
- share information using a range of information and communications technologies (e.g., voice, e-mail, computers)
- use relevant scientific, technological and mathematical knowledge and skills to explain or clarify ideas

Manage Information
- locate, gather and organize information using appropriate technology and information systems
- access, analyze and apply knowledge and skills from various disciplines (e.g., the arts, languages, science, technology, mathematics, social sciences, and the humanities)

Use Numbers
- decide what needs to be measured or calculated
- observe and record data using appropriate methods, tools and technology
- make estimates and verify calculations

Think & Solve Problems
- assess situations and identify problems
- seek different points of view and evaluate them based on facts
- recognize the human, interpersonal, technical, scientific and mathematical dimensions of a problem
- identify the root cause of a problem
- be creative and innovative in exploring possible solutions
- readily use science, technology and mathematics as ways to think, gain and share knowledge, solve problems and make decisions
- evaluate solutions to make recommendations or decisions
- implement solutions
- check to see if a solution works, and act on opportunities for improvement

Personal Management Skills
The personal skills, attitudes and behaviours that drive one's potential for growth

You will be able to offer yourself greater possibilities for achievement when you can:

Demonstrate Positive Attitudes & Behaviours
- feel good about yourself and be confident
- deal with people, problems and situations with honesty, integrity and personal ethics
- recognize your own and other people's good efforts
- take care of your personal health
- show initiative, drive and energy

Be Responsible
- set goals and priorities balancing work and personal life
- plan and manage time, money and other resources to achieve goals
- assess, weigh and manage risk
- be accountable for your actions and the actions of your group
- be socially responsible and contribute to your community

Be Adaptable
- work independently or as part of a team
- carry out multiple tasks or projects
- be innovative and resourceful: identify and suggest alternative ways to achieve goals and get the job done
- be open and willing to consider new ideas and different perspectives
- learn from your mistakes and accept feedback
- cope with uncertainty

Learn Continuously
- be willing to continuously learn and grow
- assess personal strengths and areas for development
- set your own learning goals
- identify and access learning sources and opportunities
- plan for and achieve your learning goals

Work Safely
- be aware of personal and group health and safety practices and procedures, and act in accordance with these

Teamwork Skills
The skills and attributes needed to contribute productively

You will be better prepared to add value to the outcomes of a task, project or team when you can:

Work with Others
- understand and work within the dynamics of a group
- ensure that a team's purpose and objectives are clear
- be flexible, respectful, co-operative and supportive of the thoughts, opinions and contributions of others in a group
- recognize and respect people's diversity, individual differences and perspectives
- accept and provide feedback in a constructive and considerate manner
- contribute to a team by sharing information and expertise
- lead or support when appropriate, recognizing a group's need for high performance
- understand the role of conflict in a group to reach solutions
- manage and resolve conflict when appropriate

Participate in Projects & Tasks
- plan, design or carry out a project or task from start to finish with well-defined objectives and outcomes
- develop a plan, seek feedback, test, revise and implement
- work to agreed quality standards and specifications
- select and use appropriate tools and technology for a task or project
- adapt to changing circumstances and information
- continuously monitor the success of a project or task and identify ways to improve

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Exhibit 2
Bridging the Digital Divide: North American and International Public Sector Responses

Governments are responding to the challenge of including Aboriginal peoples and minority groups in the information technology revolution:

CANADA: Connecting Canadians and Building Aboriginal Digital Opportunities

The federal government is committed to becoming the world leader in Internet connectivity. Initiatives such as Industry Canada's Community Access Program (CAP) and SchoolNet have been developed to give communities across Canada access to the Internet. Through these programs, funding has been provided for direct-access computer stations and other learning technologies that have benefited numerous Aboriginal communities.

Human Resources Development Canada's Office of Learning Technologies has created two funding programs directed at enhancing use of learning technologies within communities, including Aboriginal communities. New Practices in Learning Technologies (NPLT) supports projects that focus on understanding how learning technologies can be used with adult learners. Community Learning Networks Initiative (CLNI) supports pilot projects that promote or enhance access to learning opportunities through technology.

One Aboriginal CLNI project is the Kuh-ke-nah Network of SMART First Nations. The project involves the development of operational strategies for a variety of broadband telecommunications applications and services in six First Nations communities in northern Ontario. The CLN component of the project will support local networking development and community-wide access to advanced telecommunication services such as library services and videoconferencing for professional development and distance education.

The Federal Economic Development Initiative for Northern Ontario (FedNor) has been supporting northern Ontario's First Nations communities in achieving the benefits of connectedness. In 2001, FedNor invested $228,000 in a Keewaytinook Okimakanak Tribal Council Pilot project to deliver health career improvement programs using an Internet-based self-education technology. The initiative will allow First Nation members to receive accredited training without having to leave their communities.

Recent studies have highlighted increasing levels of Canadian connectivity. Studies by the Conference Board, *Connectedness and the Economy: Measuring Our Performance (2000)*, and the Public Interest Advocacy Centre, *The Dual Digital Divide: The Information Highway in Canada (2000)*, indicate that Internet connectivity is increasing over time and that the digital divide is narrowing. While including rural populations, these studies do not provide data relating specifically to the situation of Aboriginal peoples.

UNITED STATES: Moving Towards the Digital Inclusion of Native Americans

The United States has taken a leadership role in addressing the issue of the digital divide. Since 1996, it has issued an annual report on the state of U.S. telecommunications and information technology. Significantly, the title of this report has shifted from *Falling Through the Net: Defining the Digital Divide* in 1999 to *Falling Through the Net: Toward Digital Inclusion* in 2000. While not directly addressing Native Americans, the document suggests that digital inclusion is an achievable goal for traditional digital have-not communities.

In 1995, the Office of Technology Assessment published the seminal report *Telecommunications Technology and Native Americans: Opportunities and Challenges*. The report examines opportunities, challenges and barriers to using telecommunications technology for Native American community building. Notably, it outlines Native American efforts to learn and develop learning technology education systems.

The G8 and UNITED NATIONS DEVELOPMENT PROGRAM: A Global Strategy to Bridge the Digital Divide

The *OpportunITy* initiative was created at the G-8 summit in Okinawa, Japan, to support the G-8 Digital Opportunities Task (DOT) Force. The mandate of the G-8 DOT Force is to promote the goal of achieving digital access and education for all. The *OpportunITy* program has three main components:

- ✓ Setting of strategy, targets and an implementation plan to bridge the digital divide within 10 years
- ✓ Initiation and scaling-up of at least six major initiatives around the world
- ✓ A stakeholder campaign designed to win support and generate demand for digital investments

of Nunavut and the Nisga'a demonstrate, if Aboriginal peoples are to truly take greater control of their own affairs, they will need to develop a supply of qualified professionals. Effective partnerships with private and public sector organizations can help to facilitate this process.

Greater control over education programming and delivery helps to promote the use of technology in a culturally relevant manner. Aboriginal communities emphasize the importance of this point: technology needs to support and enhance Aboriginal traditions, values and practices. Increased local control ensures that technology programs and educational standards are relevant to local learner needs and that they contribute to the achievement of local community digital opportunities.

Exhibit 3
Private Sector Initiatives to Build Digital Opportunities

Leading businesses, particularly those in the information technology sector, have begun to take action to address the shortage of skilled knowledge workers. U.S. and Canadian initiatives are designed to close the Internet and computer access gap for minority and lower income groups. Some initiatives specifically recognize that Aboriginal peoples represent a significant and valuable skilled labour resource.

CANADA

SaskTel–Federation of Saskatchewan Indian Nations: SaskTel has entered into a partnership with the Federation to work together in a number of areas, including education and employment. One initiative, the Careers in Electronics program (in partnership with the Saskatchewan Indian Institute of Technology) gives students basic electronic skills as a bridge to further training in the electronics or electrical fields. The program combines academic training at SIIT with on-the-job training at SaskTel. The hope is that growing interest among younger students in studying computer technology and electronics will help to recruit more people with an interest in this area.

Concordia University, IBM, HRDC Office of Learning Technologies and INAC Distributed E-Learning Community for First Nations Science Education: A New Practices in Learning Technologies Project: This will establish an on-line community through which educators and learners in Aboriginal communities can work together to raise the capacity of Aboriginal youth in mathematics and sciences and in information and telecommunication technologies.

Suncor Energy and Athabasca Delta Community School (ADCS) Information and Communications Technology Project: In 1997, ADCS and Suncor formed a partnership to help the school achieve its vision "to establish information and communications technology as a priority in education for the school and the community." Suncor has invested $50,000 in the school's ICT program over the past four years. Program participants feel that as students learn technological skills, their ability to participate in the regional economy will grow and the community will prosper.

UNITED STATES

Delta One: A joint U.S. government/corporate initiative that uses programmers from the Defence Department, IBM, Raytheon and Lockheed-Martin to recruit, train and employ American Indians in software development, the program trains Native Americans in software skills that are currently needed by industry and can be utilized while remaining on traditional lands. The intent is to provide opportunities for Aboriginal people who might otherwise not participate in the industry.

Teach to the Future: An Intel initiative (supported by other large U.S. technology firms), its goal is to train classroom teachers to promote project-based learning and effectively integrate the use of computers into their existing curricula to increase their students' learning and achievement.

"Shifting to digital learning is critical to the success of education... Not only does it allow for relevant, innovative approaches that open new worlds of learning, but it will ensure that today's children can be productive members of tomorrow's workforce." (John Hendricks, Founder, Chairman and CEO of Discovery Communications, Inc.)

1 *Performance and Potential 2000–2001* (Ottawa: The Conference Board of Canada, 2000), p. 57.

2 Ibid., p. 63.

3 Ibid., p. 63.

4 "Survey: The Young," *The Economist*, December 23, 2000, p. 8.

5 The Conference Board of Canada's *Employability Skills 2000*+ and the Advisory Panel on Science and Technology's *Report of the Expert Panel on Skills: Stepping-Up Skills and Opportunities in the Knowledge Economy*.

6 *Report of the Auditor General of Canada*, 2000.

7 Royal Commission on Aboriginal Peoples, *Gathering Strength—Canada's Aboriginal Action Plan* (Government of Canada, 1997), p. 27.

Building Skills and Strengths: Aboriginal Learning Technology Initiatives

KEY FINDINGS

Aboriginal communities are attempting to achieve positive change through the use of learning technologies.

Communities are using both synchronous and asynchronous technologies for learning.

Technology changes the relationship between teacher and learner.

Technology is most effective when it acts as a bridge between traditions and training.

Aboriginal peoples are realizing significant benefits from learning technologies, such as self-directed and distance learning.

Aboriginal peoples require support to address the significant financial, geographic, social and infrastructure challenges they face.

Aboriginal communities are exploring and developing innovative solutions to existing challenges.

Aboriginal communities recognize that technology needs to be a fundamental component of their education and training. Approaches to technology implementation vary from community to community. Differences in approach often depend on context: strength of community leadership and understanding of learning technology potential, stage of economic development, degree of geographic isolation, and the specific learning needs of students. Approaches also depend on the community's level of sophistication in learning technology use. Communities like the Montana First Nation relate technology to a stra-tegic vision and defined objectives, while others use tech- nology on an as-needed basis to complement traditional teaching methods. Communities like the Nisichawayasihk and Musqueam First Nations are developing innovative solutions that utilize the benefits of learning technologies, while others are struggling with how to put these technologies into effective use.

Learning Technologies Used by Aboriginal Communities

Analysis of the 10 case study communities demonstrates that Aboriginal peoples are using a range of technologies to meet their education and skills training needs. Both synchronous and asynchronous technologies are in use and are being employed with various degrees of success. Examples identified in profiled Aboriginal communities include:

- local area networks (allow teachers to access and share information for course preparation);
- Internet;
- e-mail;
- distance education courses;
- community computer centres (computer access);
- community access projects (Internet access);
- videoconferencing; and
- video and film.

Learning technologies alter the relationship between teacher and learner (Exhibit 4). Aboriginal communities are embracing the potential of these technologies and merging them with traditional pedagogical methods to help maximize learner experiences. Aboriginal educators are implementing technology as part of a balanced approach. Technology needs to be used where it can provide a useful benefit in conjunction with traditional approaches to teaching and training. Technology is not viewed as a replacement for traditional teaching methods; rather, it is viewed as a supporting and complementary means of enhancing the learning and skills development of Aboriginal learners.

Exhibit 4
Impact of Technology on Education and Training Delivery

The OLD System...	merges with...	the NEW System
Teacher as knowledge holder		Teacher as knowledge facilitator
Information dissemination		Information exchange
Standardization		Flexibility
Classroom learning		Any time, any place
Group learning		Self-directed and collaborative learning
One-to-one/one-to-many		Many-to-many

Sources: TeleLearning Network of Centres of Excellence, 1999; The Conference Board of Canada, 2000.

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Objectives of Learning Technology Use

Aboriginal educators and community leaders recognize that learning technologies can provide substantial benefits. Objectives of learning technology use:

- To enable Aboriginal peoples to participate in the knowledge and information technology economy
- To create employment and economic development opportunities
- To promote the acquisition of knowledge and development of essential skills and attitudes in order for individuals to become self-sufficient, valued and contributing members of their community
- To preserve language and culture and to exchange with other cultures

Fort Albany

✓ "Elders said that we have to teach our children about both worlds; we need to teach them about the business world as well as the Aboriginal world, history and culture."

✓ "Children can make a living in their community, and if they go to Toronto they won't be lost."

✓ "Learning technologies open up the world to the children—they are better prepared to face the outside world."

Five Benefits of Learning Technologies

Aboriginal communities are embracing the potential of technologies for learning. In cases like the Meadow Lake Tribal Council and the Sahtu Divisional Education Council, substantial gains in student learning are already being realized through the use of technology in combination with traditional teaching methods. In other cases, like the Kwanlin Dun First Nation, technology adoption and use are still at an early stage but becoming ever more important. Aboriginal representatives identified five common groupings of positive outcomes:

- Attraction and retention of students
- Enhancement of learning, knowledge and personal development
- Facilitation of the transition from dependency to self-sufficiency
- Protection and preservation of Aboriginal culture and heritage
- Creation of community economic opportunity

Attraction and Retention of Students

Using technology in the classroom helps to build student interest in attending school. In most communities, the level of home computer penetration is extremely low. Students look forward to the opportunity to do work and play games on the school computer. In some cases, the computer is used as a reward mechanism to encourage homework. Distance learning courses also encourage students to stay in school by providing them with flexible options for course delivery. Students are increasingly able to stay in their home communities to finish school instead of having to travel to larger communities to finish their senior high-school education.

Sahtu Divisional Education Council

In 1999–2000, a distance education pilot project linked Grade 10 students in five Sahtu region communities via the Internet. Course content was delivered by e-mail and by telephone. Students were able to converse with classmates through a bulletin-board discussion group. This forum allowed students to interact with peers, exchange ideas and develop a learning community.

Enhancement of Learning, Knowledge and Personal Development

Learning opportunities offered by computer applications help to address the different ways in which students learn. Individual students are unique in the way they conceptualize and express their thoughts. This is especially important in the case of Aboriginal learners, who often form mental maps that are based on relationships, as opposed to the Western emphasis on hierarchical structure. Schools like Otetiskiwin School in Nelson House are using computer applications that allow their students to draw and present their vision of how concepts relate to one another. This approach helps to foster self-confidence in individual students.

Using technology for learning also helps students to study and conduct research. Access to information is a challenge for schools that do not have access to quality library resources. The ability to browse the Internet for information enables students to expand their range of source material and gain a more comprehensive understanding of the topics they research.

Students are also able to receive quality instruction in their home communities through distance education. Some communities and regions in northern Canada, such as the Sahtu region, do not have the critical mass of students to justify having a teacher in the school. In these instances, students are able to join with students at other schools in a virtual learning community. One teacher is thereby able to reach many learners and to deliver courses

in a wider spectrum of subjects than would otherwise be possible. Students are also able to collaborate on projects and develop teamwork and networking skills.

Facilitation of the Transition from Dependency to Self-Sufficiency

Technology gives adult learners a better chance to make the transition from relying on government assistance to self-sufficiency. Aboriginal people need the same positive reinforcements as do other members of Canadian society, but many of those living on-reserve mention a prevailing sense of helplessness and lack of opportunity. Technology-based education and skills training can help contribute to a positive sense of potential, and developing the skills and capabilities necessary to compete in the workforce is a first step towards realizing that potential.

> ***Tobique First Nation***
>
> A successful program aimed at providing relevant experience to Aboriginal peoples is the Advanced Training and Services Technology Certification Program at the Tobique Information and Technology Learning Centre. An intensive 40-week computer training course will enable 26 Aboriginal students to become Microsoft certified technicians. This will enable them to secure employment in the information technology area, while at the same time helping their communities with the use of information and communication technologies for learning, networking and Internet access.

Protection and Preservation of Aboriginal Culture and Heritage

Learning technologies are being used to preserve and protect Aboriginal values, languages and cultures. Some communities, such as the Musqueam First Nation, are using software to document their language. Community members are able to access the program to learn and maintain their language.

> *"The best Indian education reminds people of who they are culturally while simultaneously taking them into the future. But some wonder whether Indian values can survive among all those hard drives and megabytes."*
>
> (Richard Simonelli, "The Path of Native American Education: Where Tradition and Technology Meet," *Technos Quarterly*, vol. 2, no. 3, 1993)

The Internet allows learners to find out about other cultures, beliefs and values while preserving and promoting their own culture and language. In doing so, Aboriginal communities are trying to achieve a balance between the "push" and "pull" of the Internet.

Creation of Community Economic Opportunity

Giving Aboriginal learners the skills and capabilities to utilize technology is seen as an important component of generating new economic opportunities. Not only do members have the requisite abilities to compete for employment opportunities, they increasingly have the know-how and entrepreneurial spirit to develop new and spin-off opportunities. The emergence of a knowledge economy where geographic location and physical assets are no longer limiting determinants of competitive advantage provides an opportunity for Aboriginal communities. These benefits are positioning Aboriginal peoples to build and take advantage of digital opportunities.

Five Challenges to Using Learning Technologies

Numerous challenges are constraining the achievement of learning technology benefits. Some barriers may be overcome through the development of innovative and creative solutions, while others may be entrenched and difficult to resolve. Aboriginal communities identified five main categories of barrier:

- Insufficient financial resources
- Inadequate human resources and technical support
- Limited physical and telecommunication infrastructures
- Lack of an enabling social and economic environment
- Limited control over education and training

Insufficient Financial Resources

Financial pressures were cited frequently as a significant barrier to the acquisition and effective use of learning technologies. Buying computer hardware and software, paying for long-distance Internet connections, upgrading systems to ensure compatibility and functionality, and outsourcing technical maintenance services are expensive and taxing on school budgets. Due to the rapid pace at which technology becomes dated, existing systems must be continually upgraded using scarce resources. Remote communities often have to fly in technical maintenance support at costs of thousands of dollars per day.

Inadequate Human Resources and Technical Support

High teacher turnover rates and the absence of locally available technical maintenance services make it difficult for educators to use technology as they would like to. Teachers have to feel comfortable to apply technology effectively in the classroom. They have to be aware of the resources available and what the possibilities are. Some older teachers are

reluctant to embrace technology, preferring to retain traditional teaching methods. Younger teachers, who are often more technologically proficient, are typified by high turnover rates. Difficulties in adapting to different cultures and the lure of urban teaching opportunities make it a challenge to retain young staff with valued skills and technical competencies. Rapid change in staff also makes it difficult to justify substantial investments in teacher technology training.

Human Resource Barriers

- Inadequate training and inexperience with new technologies
- Fear of changing teaching methods
- Fear of losing classroom control

Most communities do not have on-site technical maintenance and support staff. Communities like the Nisichawayasihk Cree Nation have a qualified community member able to take care of most technical problems in-house. The other profiled communities outsource services to contractors on a monthly or as-needed basis, an approach that is both expensive and unreliable. The lack of on-site support makes it difficult to commit to using technology on a regular basis. Communities cite examples of students losing weeks of self-directed learning due to computer downtime.

Fort Albany

One of the major challenges facing the community is limited access to the Internet. Fibre optic connection exists only as far as Moosonee; there is need for a hook-up to Fort Albany. There are only six telephone lines (installed by Bell Canada since 1998); this provides limited access to the Internet, with only some people having access at a given time. Community leaders feel that if they are connected through fibre optic cable there will be improved access to the Internet.

Communities also need qualified experts to help them identify what their technology needs and options are and how to best integrate the options into their learning and skills training strategy. Several communities indicated that they feel uncertain about their needs and how technology can be best used to meet them.

Limited Physical and Telecommunication Infrastructures

High-speed Internet connections, local Internet service providers (ISPs), numerous community telephone lines, large facilities to house computers and community access centres, and infrastructures to support technology make up a wish list for Aboriginal communities. The reality for most is that such infrastructures are either insufficient or non-existent. Poor Internet connectivity is cited as one of the most challenging barriers to effectively implementing educational strategies and to achieving Aboriginal digital opportunities. Educators and learners complain of reduced ability to take advantage of technologies that require high-speed connections, such as teleconferencing and interactive distance education. They feel that opportunities to learn, exchange information and ideas, and develop innovative economic services are contingent upon becoming fully networked with the rest of the world and that current infrastructures limit their options.

Lack of an Enabling Social and Economic Environment

Kativik School Board

Social problems are "a fundamental aspect that needs to be addressed before technologies can be used as tools for learning/education." Children who haven't eaten or slept well view technology as being at the bottom of their priority list. The school board provides the technology to facilitate learning—but the environment itself is not conducive to learning, let alone using computers and learning technologies.

Technology offers opportunities to Aboriginal communities, but it is not the sole remedy for the serious social and economic challenges that exist. Studies of Aboriginal education emphasize that healthy communities = healthy schools. This means strategies for delivering education and developing technological skills must go hand in hand with strategies to address endemic social issues such as poverty, illiteracy, alcohol and drug abuse, substandard shelter, and family dysfunction. Aboriginal communities identified the following social challenges:

- Poverty
- Unsafe and insecure shelter
- Lack of adequate childcare services for students with children at home
- Lack of parental support
- Family dysfunction
- Learning disabilities and behavioural problems
- Low school attendance
- Parental language barriers
- Cultural differences
- Unwillingness of adult learners to make the trade-off between modern and traditional activities
- Lack of supportive entrepreneurial and innovative environments

Communities such as the Musqueam and Kwanlin Dun First Nations emphasize that a balanced approach to using technology in learning and skills development is critical. The relationship between healthy communities and healthy schools needs to be understood and supported by all members of the community. It is important to have healthy and functional

family relationships: studies of learners indicate a strong link between having support at home and achieving success at school.[1] Achieving the maximum potential of technology as a learning tool will be difficult without this support.

Limited Control over Education and Training

Aboriginal communities would like more control over how funds are allocated to purchase capital equipment such as computers and networks and for ongoing technical maintenance expenses. For some communities, this is simply a grassroots decision-making issue. They feel that they are in the best position to know their technology needs and how funds can be effectively spent. Other communities take a more cynical view, regarding the situation as contributing to cultural suppression. As one Aboriginal representative commented, *"The best way to control people is to control the technology."* These communities feel that Aboriginal strategies and solutions are needed for meeting Aboriginal needs and solving problems.

> ***Kativik School Board***
>
> An experimental project is being discussed to test a new satellite Internet communication system for remote schools and pedagogical applications. The school in Kangiqsualujjuaq seems to be the best choice, having a key criterion for selection—a school staff that is interested, reliable, cooperative, dynamic, and experienced with and knowledgeable about new information and communication technologies.

Five Key Success Factors

Despite these barriers, Aboriginal people are achieving successes in using learning technologies. Communities interviewed identified key factors that contributed to their success. Some are common, while others are more specific due to individual circumstances. Five key success factors:

- Healthy communities supported by creative, consistent and visionary leadership
- Solid technological strategies and enabling infrastructures
- Strong human resource and technical support capabilities
- Technology skills as a foundation
- Strategies that bridge traditions with technology

Healthy Communities Supported by Creative, Consistent and Visionary Leadership

The effectiveness of technology as a tool for learning is related to a community's socio-economic situation. Technology cannot be isolated from the broader issues facing the community. In healthy Aboriginal communities, leaders, economic development officers, health and social workers, educators, technology specialists and individuals understand how they can collectively build community well-being, knowledge and wealth.

Visionary and innovative leadership is a cornerstone in building healthy communities and in using learning technologies to aid this development. Leadership needs to be continuous and consistent to provide community stability and to ensure that technology is employed as a means to achieve community objectives. Leaders need to be solutions-oriented to identify the opportunities that arise out of conflict with barriers and change. The community must also "own" the vision of where learning technologies will take them. Leaders must ensure that the community recognizes and supports the value derived from learning technologies.

> ***Haines Junction and Champagne and Aishihik First Nation***
>
> Community educators want both Aboriginal and non-Aboriginal students to be "modern thinkers." Technology is viewed as a "tool to work in conjunction with skills development and to help expand [students'] knowledge base." This perspective is reinforced by community members who emphasize the importance of having their children use computers.

Leadership can also play an important role in fostering community pride, purpose and entrepreneurial spirit. Many communities have a history of dependency and outward reliance. Often absent are environments supportive of innovation and entrepreneurial activity, as well as role models and mentors who can demonstrate to community members the kinds of opportunities that exist. Building awareness of the opportunities offered by developing technological skills and competencies is viewed as an important step in fostering innovative and entrepreneurial ideas, ideas that can enable Aboriginal peoples to generate and take advantage of digital opportunities.

> ***Nisichawayasihk Cree Nation***
>
> In 1996, the Grade 9 communications class began learning graphic design skills and applied their expertise to building an Industry Canada Aboriginal Digital Collections Web site about Indian treaties: (http://collections.ic.gc.ca/treaties/code/).
>
> Building upon this experience, three female students began a small business called Wacky Graphics, which was housed in the school and provided local graphic design services. Over the next four years, these students designed client-contracted products such as calendars, funeral brochures and community election ballots. Revenues were paid to the school, which then paid the students market rates after deducting printing costs. This initiative helped to foster their entrepreneurial spirit and provided them with marketable skills and experience to potentially apply upon entering the workforce after graduation.

Solid Technological Strategies and Enabling Infrastructures

Communities need to ground their vision of what they want to achieve with technology within the limitations of existing infrastructures. Community learning needs have to be identified and technology matched with these needs. Communities like the Montana First Nation and the Meadow Lake Tribal Council have adopted a project-based spending model whereby they allocate financial resources to projects that have been identified as having a purpose within a defined vision and objectives. Funding is directed only to those technologies that are likely to result in a net positive impact on learners.

Technology has to be adopted where it works best and where resources and the infrastructure exist to support it. Communities need to have the "know-what" and "know-how" to understand what their technology options are and what options fit best with their needs and objectives.

> ***Kwanlin Dun First Nation***
>
> Educators cite the difficulty of "trying to keep up with the train." This refers to the challenge of maintaining pace with software and hardware advances and with the technical skills associated with these developments. Training sessions and workshops are given to all departments in order to raise the overall level of community expertise.

Strong Human Resource and Technical Support Capabilities

Teacher education may be one of the most important factors in achieving successful learning technology outcomes. As Exhibit 4 (page 11) illustrates, technology reorients but does not replace the role of the teacher in the classroom. Technology can be effectively applied only if a teacher feels comfortable with it, understands how to use it, and recognizes how it can be used to maximize the learner's educational and/or skills training experience. Aboriginal educators cite investing in professional development and training for teachers as a key success factor. This includes:

- helping teachers to become aware of existing mental models and practices and to incorporate technology-based thinking into their mindset;
- raising teacher awareness and appreciation of computers; and
- ensuring that teachers are trained to make better use of computers through understanding their quality, utility and potential.

Educators need to understand the impact of technology on student learning. This means giving students sufficient time to ensure they have confidence in their ability to use learning technologies. It means allowing individuals with different learning styles to learn at different paces and to express their thoughts in different ways. Self-directed learning software allows students to study at their own pace and to represent their thinking through both written and visual formats.

Technical support skills also need to be developed. Maintaining consistent and reliable technical support is a crucial factor in a school's ability to build technology into the curriculum. Downtime due to computer difficulty can lead to frustration and disillusionment. Problems can never be eliminated, but having a qualified and competent person on staff to troubleshoot can help to alleviate some of these problems.

Technology Skills as a Foundation

Several schools commented on the need to view technology as a foundational skill. Technology needs to be used throughout curriculum delivery rather than limited to specific computer instruction courses. This means using computers and multimedia in courses such as language arts and life studies as well as computer science. Teachers emphasize the need to develop balanced individuals who have the ability to work with technology while also thinking critically and creatively and working collaboratively in groups. This finding aligns well with what the Board's *Employability Skills 2000+* has identified as the skills and abilities that are increasingly valued by employers.

> ***Nisichawayasihk Cree Nation***
>
> Technology skill is viewed as a foundation that underlies core curriculum areas such as math, science, language arts and social studies. Computers are in every classroom and are used to develop basic skills and competencies that students will use later in life. This philosophy emphasizes teaching students to "think critically first and then use technology."

Strategies that Bridge Traditions with Technology

Technology provides enormous potential to both benefit and negatively affect Aboriginal culture. Communities emphasize the need to strike a balance between Aboriginal culture, heritage, values and traditions and the realities of the modern economy and lifestyle. Students need both the skills and abilities to participate in the modern economy and a healthy foundation of Aboriginal culture, values and traditions. Examples such as the Musqueam First Nation Qey Sta:m Café Training Centre bring together academic, employment and personal skills training with hands-on experience while also maintaining a link with

traditional Aboriginal activities. Doing so encourages students to attend and stay in school, develops marketable skills, and fosters feelings of pride and confidence in Aboriginal culture.

Linking traditions and values with technology also helps to ensure that cultural norms and relationships are not undermined. As the importance of technology rises, the holders of technological knowledge rise in importance. Typically, it is community youth who possess expertise in technology use. This affects the traditional role of authority in Aboriginal communities by challenging the role of the elder as the primary source of wisdom and experience in the community. As a result, there is added importance attached to ensuring that while youth are given the skills and knowledge to compete in the modern marketplace, they are also reinforced with a strong understanding of and attachment to cultural values and traditions.

Characteristics of Successful Aboriginal Learning Technology Initiatives

- Community buy-in and support
- A technology vision and champion
- Teacher education that enables them to maximize the potential of technology for learning
- Strong physical and telecommunications infrastructures
- Ongoing technical support and maintenance
- Linking of technology with culture and tradition

Solutions and Future Initiatives

Aboriginal communities are looking forward and developing innovative solutions to existing challenges. Some of these solutions are technology-oriented, such as high-speed satellite Internet connectivity and interactive Web-based distance education delivery, which will require significant infrastructure development and capital investment. Other solutions focus on "soft" issues, such as reorienting the role of the teacher in the classroom and investing in human resources and technical support training. Communities are also looking at ways to develop partnerships and relationships with other Aboriginal groups and private sector and governmental organizations to help maximize the delivery of learning technology-based programming. Key areas of focus for future initiatives are:

- infrastructure investment and upgrading;
- strengthening of human resource and technological capabilities;
- use of technology to maximize education and training delivery;
- exchanging of information with other Aboriginal communities; and
- building of partnerships with government and the private sector.

Infrastructure Investment and Upgrading

Communities such as the Meadow Lake Tribal Council and Montana First Nation are working on how to upgrade existing Internet connectivity to increase upload and download speeds and to reduce connection fees. They are looking towards initiatives like the Headwaters Project (see Meadow Lake case study) to enhance community connectivity and to the recently launched Anik F1 satellite to provide them with wireless, high-speed Internet connection.

They are also focusing on ensuring that the proper infrastructure is in place (e.g., physical space, power supply, wiring) to address basic issues such as having an adequate number of plugs for the computers that will be used and the necessary power to run the machines.

Strengthening of Human Resource and Technological Capabilities

Teachers are central to the learning and education process. Aboriginal educators are looking to develop and strengthen teachers' knowledge and understanding of learning technologies and to enable them to make effective use of technology in the classroom. They are looking to maximize the talents of teachers who are excited about learning technologies and realize their potential for self-directed, distributed and collaborative learning.

Educators are also looking at ways to develop technological capabilities within the school. These include sending teachers for hardware and software training and developing peer learning communities within the school to share knowledge and experience. By building in-house technical competencies, schools can address troubleshooting, maintenance and support issues while reducing the cost of service outsourcing.

Use of Technology to Maximize Education and Training Delivery

Aboriginal schools and training programs are actively looking at ways to maximize the benefits of technology for learning. They recognize that technology adoption will not address their needs on its own. Development of leadership and vision regarding how computers can address the education and learning needs of students is a critical first step for many communities.

They are also looking at ways to use computer applications to motivate and excite students. As Aboriginal

communities gain responsibility for creating and delivering, there will be additional opportunity for them to develop courses that are of local relevance as well as being applicable within the larger community. Linking traditions with training is a key element of this approach. Representatives spoke of the need to foster Aboriginal awareness and pride to provide students with a strong foundation to work from.

Sahtu Divisional Education Council

Building on the success of the pilot project, the Council has signed a Memorandum of Understanding with Chinook College and the Calgary Board of Education to allow NWT high-school students to take courses through online learning. These courses will be delivered through a friendly Web-based course management software platform called WebCT, which offers educators a variety of tools that enable them to:

- ✓ develop a friendly Web-based interface;
- ✓ create easy-to-develop course content; and
- ✓ jointly develop more distance education modules.

Education and skills training initiatives will emphasize the development of basic competencies that build community capacity and also open up opportunities for economic development through skills transfer. Several communities spoke of the need to provide high-risk students with access to technology that interests them and to give them the opportunity to develop skills that will enable them to work.

Communities are looking towards distance-based learning as technological infrastructures develop and high-speed Internet access and connectivity come online. Examples like the Sahtu Divisional Education Council illustrate how they will be focusing on using Web-based course management software platforms so youth can finish high school in their own communities and prepare for post-secondary education and employment opportunities.

Exchanging Information with Other Aboriginal Communities

Aboriginal people are looking to share experiences and solutions with one another. Representatives have underlined the need to have Aboriginal solutions to Aboriginal problems.

What Will Aboriginal Technology-Based Learning Look Like in the Future?

- ✓ High interactivity
- ✓ Wide accessibility
- ✓ Distributed learning and tele-mentoring
- ✓ Increased communication and information exchange
- ✓ Virtual peer learning communities
- ✓ More student centred
- ✓ Enhanced flexibility
- ✓ Asynchronous and synchronous

They emphasize the importance of interacting in order to:

- share experiences with other Aboriginal schools that use computers to their maximum potential;
- examine options for developing solid and reliable technology support;
- identify how to leverage the drawing power of technology; and
- develop strategies for using the Internet as a "push" and "pull" mechanism for increasing Aboriginal cultural awareness.

Building Partnerships with Government and the Private Sector

In seeking to provide students with the most effective technologies and learning experiences, Aboriginal communities are looking for opportunities to partner. They are looking to government agencies and businesses for financing, technical resources and professional mentorships to enhance their technological capabilities, and building partnerships will give them access to the resources they need to identify and realize economic opportunities in the knowledge economy. Mentoring is viewed as an important means of building Aboriginal confidence and competencies.

Study participants also highlighted the need to coordinate efforts with government to promote the development of high-speed Internet broadband infrastructure. Significant investment in telecommunications, either wireless or wireline, on the part of government and the private sector is viewed as a primary means of ensuring adequate connectivity for Aboriginal communities.

1 Network of Innovative Schools, *Innovation Through Technology and Learning: The Challenge of a Technology-enriched Curriculum*, 2000; Barbara J. Spronk, "Appropriating Learning Technologies: Aboriginal Learners, Needs and Practices," in *Why the Information Highway? Lessons from Open and Distance Learning*, 1995.

Aboriginal Perspectives on How to Take Action to Build Digital Opportunities

KEY ACTION POINTS

Communities are looking to build strategies for learning technology adoption and implementation that reflect Aboriginal perspectives and realities.

They want to see connectivity initiatives such as Industry Canada's CAP Program expanded to include funding for technical maintenance and teacher training. They also want to take advantage of other funding programs, such as FedNor, HRDC's Community Learning Networks Initiative (CLNI) and New Practices in Learning Technologies (NPLT), to share information and develop skills.

Collaboration between Aboriginal communities, government, business and not-for-profit organizations is needed to develop holistic solutions and opportunities.

Communities need further research on their Aboriginal learning technology experience to feel confident that initiatives will achieve their intended outcomes.

Creation of Aboriginal digital opportunities will result from the dedicated efforts of community leaders and educators. Communities have demonstrated an ability to deal with challenges in hand and to come up with innovative solutions that are of value to learners. Leaders are looking to the future and envisioning the opportunities that become possible with additional human and financial resources, strengthened telecommunications infrastructures and multi-stakeholder partnerships. During research conducted for this report, Aboriginal leaders, administrators and educators identified a number of key action steps that they feel will help them to grasp these opportunities.

Emphasize "Ownership" of Learning Technology Applications and Outcomes

Aboriginal communities emphasize that learning outcomes must match the needs of learners and the community in general. Technology has the potential to reinforce and strengthen Aboriginal culture, values and traditions; however, it also can isolate the learner and contribute to a detachment from traditional ways of life. Educators stress the need for approaches that result in outcomes that will strengthen Aboriginal communities and contribute to economic and cultural well-being.

To this end, Aboriginal communities want greater involvement in defining the relationship between technology and learning. They want to ensure that initiatives result in outcomes that are compatible with their reality. They want to be able to participate, from the earliest stages of decision making, in the selection and application of appropriate technologies.

Identified options for linking decisions with outcomes and for empowering Aboriginal peoples with responsibility for how technology is used in their communities include the following:

- Enhance the role of Aboriginal educators in the assessment of educational and technology needs.
- Increase Aboriginal responsibility and capacity for education programming and curriculum development.
- Develop mechanisms that link technology with tradition so that people can interact and exchange experiences, perspectives and solutions with one another.

> *"The empowerment of women and men to utilize new technologies and to apply their creative potential, knowledge and ability to their development challenges appears increasingly to be one of the keys to enhancing the capabilities of developing countries and poor communities to leapfrog stages of development and thereby close the income and human development gap."*
>
> (United Nations, *Development and International Cooperation in the Twenty-First Century: The Role of Information Technology in the Context of a Knowledge-Based Global Economy)*

Expand the Scope of Connectivity Initiatives

Initiatives such as Industry Canada's Community Access Program (CAP), Aboriginal SchoolNet and the Federal Economic Development Initiatives for Northern Ontario, as well as Human Resources Development Canada's Office of Learning Technologies funding programs, New Practices in Learning Technologies and Community Learning Networks Initiative, are important components of the federal government's goal of "connecting Canadians." These initiatives provide access to resources for capital equipment such as computers and modems and funds to promote innovative learning technology practices. Numerous Aboriginal communities have benefited from the programs and have used technology in education and training.

Interviewed representatives stressed the need to view learning technology as a continuum. Equipment requires ongoing technical support and maintenance and must

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be used by qualified and trained teachers. However, the current funding emphasis on providing communities with access to upfront financial resources means that ongoing costs are generally the responsibility of individual communities. In many cases, communities are unable to meet these requirements.

Aboriginal leaders, administrators and educators have suggested numerous options for helping communities meet their needs. Options identified by the communities that participated in this study include the following:

- Broaden funding criteria to include support and maintenance costs, as well as the costs of training teachers to use and troubleshoot the technology.
- Develop innovative partnership solutions with government and the private sector to provide low-cost Internet connectivity as well as technical maintenance support (e.g., the Keewatin Career Development Corporation's Headwaters Smart Communities Demonstration Project).

Develop Holistic Solutions to Related Challenges

> *"There are few public interest challenges that require the coordinated effort of governments, business, philanthropic and educational institutions. Delivering simple, rich connectivity paired with access to education and training to the greatest numbers in the information age is one such challenge."*
>
> (Eric Benhamou, Chairman and CEO, 3Com Corporation)

Learning technologies alone cannot address the serious social and economic challenges that many Aboriginal communities face. They represent only one piece of the puzzle; coming up with effective solutions to complex problems will require a holistic and coordinated approach on the part of all community stakeholders. The development circle includes technological, educational, social, cultural, economic and environmental dimensions. Communities need to leverage the technology experience, knowledge and resources of government agencies, private sector businesses and not-for-profit organizations to develop effective and sustainable solutions. Partnerships can help to establish an economic technology bridge between business and Aboriginal communities, enterprises and organizations.

Aboriginal representatives interviewed for this study identified the following steps to address the above challenges.

- Define technology needs, existing capacity and resources, options and opportunities available to meet those needs.
- Build community and stakeholder understanding of how issues relate to and are affected by one another.
- Strengthen lines of communication and opportunities for stakeholder dialogue and collaboration so the private sector can understand needs and options and develop solutions.
- Develop, measure, assess and evaluate commonly understood indicators so Aboriginal leaders, government and business can see which initiatives are working and which ones are not.
- Develop learning, skills training and business development programs to facilitate the creation of employment and enterprise.

Strengthen Understanding of the Impact of Learning Technologies on Aboriginal Learners

Extensive research has been conducted on the impact of learning technologies on learners in general, but significantly less has been focused on the impacts and outcomes of Aboriginal initiatives. The research that does exist includes both empirical and anecdotal evidence and offers both positive and negative assessments. Aboriginal communities are looking for further research resources. They mention the need to have greater confidence when attempting to decide which technologies and technology strategies are most likely to contribute to desired learner outcomes. This is especially important with regard to Aboriginal culture, traditions and values. Technologies need to be applied that will build learner capabilities and skills while at the same time fostering pride in and strengthening community links, beliefs and traditions.

Aboriginal communities want to better understand what works and what doesn't.

Participating Aboriginal communities identified the need for the following action steps:

- Strengthen their understanding of what works and what does not.
- Link this understanding with provincial/territorial curriculum guidelines so Aboriginal learners can achieve performance standards while preserving traditions and values.

Aboriginal Learning Technology Decision-Making Framework

Aboriginal communities are learning from one another about what works and what does not. Each community is different and faces its own unique set of challenges and opportunities. The case studies contained in the Appendix demonstrate what is possible if Aboriginal peoples embrace technology, learn from one another, and build upon good-practice examples.

The Aboriginal Learning Technology Decision-Making Framework (Exhibit 5) uses the experiences and insights of interviewed Aboriginal leaders and educators, steps recommended by the CEO Forum on Education and Technology,[1] and previous Conference Board of Canada work.[2] This valuable resource tool, grounded in Aboriginal reality, lays out a step-by-step process that communities can refer to when deciding on issues such as what kinds of computers they need, where the balance between traditional and computer-based teaching should lie, and how to decide between self-directed and distance-based learning.

The Framework establishes a bridge between traditional and modern Aboriginal decision-making processes. It lays out considerations regarding technology choices, learner needs and performance indicators that may be considered by Aboriginal educators and community members. It is up to the communities to decide how best to evaluate these considerations in accordance with traditional modes of decision making. Interviewed Aboriginal educators (several of whom are implementing educational strategies that follow this framework) strongly emphasize the importance of grounding decisions in traditional values and culture.

Step 1: PLAN WHAT YOU WANT LEARNING TECHNOLOGIES TO DO FOR YOUR COMMUNITY

Planning helps to identify how learning technologies will contribute to the effective delivery of education and training and to the achievement of community socio-economic outcomes. It is also an important means of ensuring that the learning process is culturally grounded and respectful of values and traditions. Addressing technology-related issues from the beginning gives educators greater assurance that initiatives will achieve desired outcomes.

Learning technology roadmaps can be used to identify a pathway to follow in meeting educational performance objectives. Roadmapping is the process of planning in order to identify, select and develop learning technology alternatives to satisfy a set of educational objectives.

Leading Aboriginal communities relate their education and technology strategy directly to their vision of what they want to achieve through combining technology with education and skills training. A community-owned vision is important. In defining this vision, the community needs to consider how technology can be used to "fill the gaps" and design a strategy that will meet the needs of the community.

Giving members of the community the opportunity to participate in defining the technology vision allows them to understand how community issues are linked together and how various initiatives contribute to the achievement of the vision. This process also helps to ensure that technology is looked at through an Aboriginal lens. Within this process, partnerships can also form among families, students and teachers, and community members.

As part of the visioning process, leadership communities also define technology objectives. These provide targets for the technology strategy to focus on. For example, a school's vision could be to become the most technologically proficient Aboriginal school in Canada. Its objective could be to provide computer access to every student. Defining a vision and objectives allows a community to envision what it would like to achieve, how technology fits into curriculum development and delivery, and how technology is to be used to reinforce and support traditions and culture.

Checklist for a Successful Learning Technology Plan

- ☐ Define a community vision for technology and education/training.
- ☐ Ensure that the community owns the vision.
- ☐ Make sure the vision is grounded in Aboriginal culture, values and tradition.
- ☐ Identify community needs and how the vision helps meet them.
- ☐ Design a strategy to meet the needs.
- ☐ Define learning technology objectives and targets.

Step 2: WORK TOGETHER TO MAKE THE PLAN SUCCEED

Making the plan work is the next big endeavour. Many communities find it difficult to translate a good plan into expected outcomes. The successful communities profiled in this study identify several critical issues relating to the effectiveness of their learning technology strategies.

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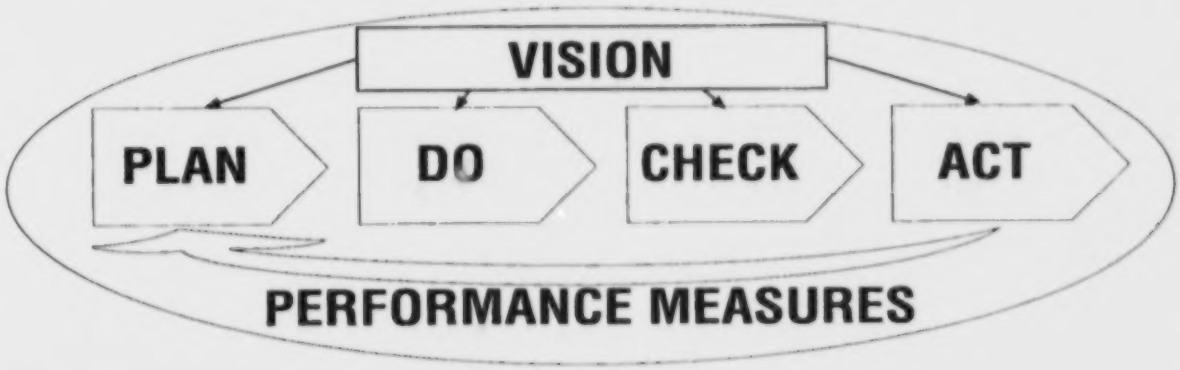
Exhibit 5
Aboriginal Learning Technology Decision-Making Framework



VISION
Involve the community in defining a technology vision that reinforces culture, values and traditions.
Identify learning and education issues and needs that are important to the community, given its socio-economic reality.

PLAN
Develop a learning technology strategy and "roadmap" with a clear purpose.
Identify objectives and goals for the use of learning technologies.

DO
Assess the cultural and contextual relevance of the plan.
Determine the impact of technology on learning and program delivery.
Take into consideration: existing technology skills; cost; course content and delivery format; and support resources.

CHECK
Define performance measures (indicators, benchmarks) that will show the effectiveness of learning technology use.
Assess performance on a periodic basis by comparing measures and indicators against standards.

ACT
Make changes to strategy and the roadmap if performance falls below target levels.
Revisit vision and strategic goals to ensure they are realistic, achievable and relevant to changing community and learner needs, priorities and realities. Also ensure that they account for changing technological advances.

Sources: TeleLearning Network of Centres of Excellence, 1999; The Conference Board of Canada, 2000.

Cultural and Contextual Relevance of the Plan

Leading Aboriginal educators cite gaps between technology goals, cultural traditions and context issues as factors that undermine the effectiveness of learning technology plans. Technology needs to support and reinforce community and culture. It cannot be separated from community goals of economic development and health, nor can it ignore issues such as unemployment, substance abuse and family dislocation. Educators need to ensure that learning technologies are used in a way that addresses these issues so students do not feel detached from their cultural and situational reality.

Impact on Learning and Program Delivery

Technology alters and reorients the traditional Western-based approach to teaching and learning by providing opportunities for learners in the form of distance, self-directed and collaborative learning. The technology plan needs to be implemented with an eye to learner development. Programs can be constructed to develop specialized individual technological skills or can focus on developing multiple competencies with technology as a foundation. Ultimately, educators need to determine what kind of learning is most relevant and how technology can be best applied to meet learning goals.

Other considerations when implementing the learning technology plan include:

Existing Technology Skills
- Level of student familiarity with computers
- Level of teacher competence with technology
- Availability of skilled teachers

Cost
- Capital equipment
- Ongoing support

- Maintenance
- Equipment/software upgrading

Course Content and Delivery Format

- Course content externally developed, Aboriginal-developed or developed by a combination of the two
- Relevance of software to educator and learner needs

Support Resources

- Availability of technical support
- Appropriate and sufficient support for learners
- Appropriate and sufficient support for instructor/facilitator

Checklist: Considerations When Putting Your Plan to Work

- ☐ Cultural and contextual relevance
- ☐ Impact on learning and program delivery
- ☐ Existing technology skills
- ☐ Cost
- ☐ Course content and delivery format
- ☐ Support resources

Step 3: MAKE SURE LEARNING TECHNOLOGIES HAVE THE DESIRED OUTCOMES

To ensure that Aboriginal learning objectives are being met, educators need to measure and monitor the effectiveness of learning technologies. Ad hoc, non-systematic approaches make it difficult to gauge how well students are doing and where changes are necessary. Education and training programs can implement the following measurement tools to track performance and identify areas of improvement.

Content and Performance Standards

Content standards refer to levels of learner knowledge and understanding of learning technologies. Performance standards refer to how well learners are able to use their technology knowledge and skills. Aboriginal schools can identify specific standards against which performance can be benchmarked. For example, a school can identify a target grade score for learners to achieve. This score can be compared against previous years' scores to identify progress and against the standard to assess level of success.

Indicators

Indicators are used to represent something that points towards something else. They are used to assess characteristics or attributes that are not easily measurable (as opposed to grade scores). For example, a good indicator of learning technology effectiveness might be "penetration of technology in the classroom."

Specific measures corresponding to this indicator could include:

- number of computers in the classroom;
- number of Internet connections;
- percentage of computer/Internet use in course instruction;
- percentage of computer/Internet use in course work; and
- number of hours of computer use.

The relation between goals, indicators and corresponding performance measures can be illustrated as follows:

GOAL			
Indicator		***Indicator***	
Measure	***Measure***	***Measure***	***Measure***

Checkpoints

Instituting a series of regular checkpoints helps to ensure that performance gaps are identified and addressed quickly. Schools and skills training programs can evaluate students regularly (i.e., on a monthly/semester basis) to see how well they are doing vis-à-vis the standards and indicators.

Periodic Evaluations

Periodic auditing and evaluation of learning technology practices can help to ensure that best efforts are being made to maximize technology's benefits. Coupled with regular checkpoints, these periodic evaluations help to ensure that indicators are credible and reliable and that learner needs and objectives are being met.

Checklist: Tools for Evaluating Learning Technology Performance

- ☐ Content and performance standards
- ☐ Indicators
- ☐ Checkpoints
- ☐ Periodic evaluations

Step 4: BUILD POSITIVE OUTCOMES BY STRENGTHENING AND IMPROVING ON EVALUATION RESULTS

By using standards, measures and indicators, educators can identify gaps between actual and desired performance. Once these gaps have been identified, adjustments can be made to strategy, practice and the learning technology roadmap. Improvements can be made through initiatives such as effective resource allocation, enhanced skills training for teachers, or adjustment of learning objectives. The ultimate goal is to improve education and skills training program delivery so that learners achieve desired outcomes.

By using standards, measures and indicators, educators can identify gaps between actual and desired performance.

In addition to making implementation and practice changes, it is important for Aboriginal educators and communities to revisit their vision and strategic goals for learning technologies use. Both the vision and the associated goals need to be assessed to ensure that they are:

- realistic;
- achievable;
- measurable;
- relevant to changing community and learner needs;
- relevant to changing community and learner priorities; and
- relevant to changing community and learner realities.

It is important to remember that the learning technology roadmap constantly evolves. It is not a static snapshot view of technology's role in education and skills training. Rather, regular adjustments should take into consideration changing community goals and objectives as well as technological advances. Most importantly, the roadmap should be continually referenced to Aboriginal values and traditions to ensure that technology plays a reinforcing role.

1 CEO Forum on Education and Technology 2000, *School Technology and Readiness Report: The Power of Digital Learning —Integrating Digital Content.*

2 Jaehong Kim and Jacek Warda, *Technology Roadmapping*, Members' Briefing (Ottawa: The Conference Board of Canada, 1999).

Case Studies

1. Using Technology to Acquire Skills for Employment

Top Five Key Issues for the Tobique First Nation

- ✓ Learning technologies have the potential to help improve employment prospects.
- ✓ Experience can be gained only through hands-on work.
- ✓ Students need control over their learning pace and sufficient time to ensure confidence in the use of learning technologies.
- ✓ Learning technologies are an education tool that enables Aboriginal people to get out there and stand on their own.
- ✓ Aboriginal students have little difficulty learning technical skills.

Learning technologies have the potential to help address challenges.

Acquiring Learning Technology Skills

There are a number of challenges facing New Brunswick's Aboriginal communities, such as that in Tobique. First, regular change in community leadership leads to lack of continuity and consistency, which are needed for long-term economic development. The long-term community plan and vision require a step-by-step approach to community economic development; otherwise, economic development projects have a high probability of failure.

Second, there is high unemployment due to location away from major economic centres, lack of local employment opportunities and lower educational levels. As in other communities in New Brunswick, many Aboriginal people have encountered difficulty entering the labour force. A number of factors have contributed to this situation, including lack of sufficient/relevant education and skills and experience.

Third, the Band administration office has limited access to modern technology. In order to make the office and organization efficient, the First Nation needs the infrastructure and technology to facilitate decision making, communication with community members, and networking with other First Nations.

Learning technologies have the potential to help address some of these challenges. Experience can be gained only through hands-on work. One successful program aimed at providing relevant experience to Aboriginal people is the Advanced Training and Services Technology Certification Program at the Tobique Information and Technology Learning Centre. An intensive 40-week computer training course will allow 26 Aboriginal students to become Microsoft certified technicians. This will enable them to secure employment in the information technology area, while at the same time helping their communities with the use of information and communication technologies for learning, networking and Internet access.

The 26 participants come from First Nations across New Brunswick to study at the Tobique Training Centre, which was recently upgraded with electrical and telecommunications systems. The course at Tobique is the first major computer training course offered to Aboriginal people in New Brunswick—and plans are under way to provide it on an ongoing basis. Course participants are being trained and certified in practical computer applications where there are increasing employment opportunities in the business and government sectors.

All 26 students are expected to graduate; students know what the expectations of the program are in terms of course content, instruction and tests. During the course, the instructors encourage open discussion to address issues and challenges associated with the application/use of learning technologies. The group has become very cohesive, and a lot of learning and sharing take place among students. This is important because the course involves a major commitment, one year, 14 to 16 hours a day, and for some students, separation from family and community. The course has been very demanding, and some students needed to spend considerable time upgrading their computer skills and keeping up with the demands of the course. As one student put it, *"Information technology is an expanding field, and Aboriginal people need to jump on board; otherwise, they will be left behind."*

Benefits

The course has provided a balanced learning environment. Computers are easy and convenient to use because of the balanced combination of classroom instruction and hands-on work. Students have considerable control over their learning pace because of the structure of the course—there is sufficient time to ensure confidence in the use of learning technologies. The technical information could be difficult to grasp, but if the commitment and dedication are there, it can be done.

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Aboriginal people are realizing that they have to adapt to the realities of non-Aboriginal economy, work and expectations if they are to compete and create the conditions for economic self-reliance. Despite the challenges associated with the computer training course and its intensity, the course has been relatively successful compared to other economic/employment creation initiatives in agriculture, tourism and entrepreneurship. All have been tried at Tobique but with limited success.

"Learning technologies are an education tool that enables Aboriginal people to get out there and stand on their own—the community accepted the program with open arms. Aboriginal youth are realizing the benefits of computers and the opportunities in the new economy. They are finding the technology challenging, but you can see the dedication of students in trying to improve themselves...for a better future."
(Chief Francis)

The Tobique First Nation is spending a lot of money on post-secondary education. It plans to reallocate some of that money towards the technology course training, realizing that the demand for people with technology certification is high. Also, a reduction in welfare expenditure due to increased employment will enable the First Nation to reallocate dollars to other socio-economic development projects.

The partnership with Advanced Training and Services to provide the course has led to higher standards of education and training and better morale in First Nation communities. The education counsellor at the high school is encouraging students to acquire technical skills using learning technologies. The students from the course have become role models in their communities and are influencing the views of youth regarding technology training. This "improved morale" is critical if people are going to overcome personal limitations due to an often unstable family background, alcohol and drug abuse, unemployment and welfare dependency.

What is the cultural impact of learning technologies? It is the ability to enhance employment opportunities. Learning technologies enhance education and put Aboriginal people on an equal footing to compete for jobs. Use of technologies by schools has increased due to access to upgraded computers, technical support and teachers who are trained to transfer computer skills and access to the Internet.

The technology certification course has led to an increased awareness of computers and an interest in the course as a tool to gain employment and generate income to support one's family and community. The community is pushing towards education for jobs in technical occupations and away from traditional university degrees.

The technology training course has enabled the First Nation to look for employment opportunities beyond the limited jobs available in the local economy. Some of the students are talking about starting their own businesses. They are also talking about the application of what they are learning beyond employment and business opportunities to cultural revival and Aboriginal language training.

Students at the course gave the following suggestions for other Aboriginal adults considering taking a similar course:

- They highly recommend a course in computer technology certification.
- A high degree of dedication and perseverance is needed to absorb information and training on a daily basis.
- This is short-term pain for long-term gain. Family life will be affected. Keep the ultimate goal in mind—the certification and employment opportunities.

Students at the course provided the following recommendations for Aboriginal youth in primary and secondary schools:

- If you have an interest, explore information technology—"this is where the future is"—otherwise, you will be left behind.
- Remember who you are, be true to where you came from, use information technology to become self-reliant and spread the word around of who Aboriginal people are.
- Use learning technologies to strengthen your culture, to explore/access education, employment and business opportunities.
- Aboriginal people should be willing to move where the job opportunities are.

Lessons in the use of learning technologies by Aboriginal people:

- There are no cultural differences in learning by Aboriginal people—individuals have different learning styles and learn at different paces.
- Use comparisons/analogies from daily experience/applications; adapt teaching to students' experience—something they can relate to.
- Aboriginal students have no technical difficulties; they are into computers—they are willing to learn.

2. Learning Technologies: Overcoming the Challenges of Social Problems

Top Five Key Issues for the Kativik School Board

- ✓ Internet experience has been disappointing.
- ✓ Dedicated and knowledgeable teachers are needed to maximize students' learning experience.
- ✓ Youth view technology as brand new, exciting and fun.
- ✓ Social problems affect learning in general and access to and use of technology in particular.
- ✓ The school environment must be conducive to learning in general and then to the use of computers and learning technologies.

Kativik students are expected to acquire the knowledge and develop the essential skills and attitudes to become self-sufficient, valued and contributing members of their community.

Context

The Kativik School Board was created by the James Bay and Northern Quebec Agreement in 1975 to serve the people in the 14 communities of Nunavik and to empower the Inuit to take control of their own education. In 1978, the students, teachers and property of the former federal and provincial school systems were officially transferred to the Kativik School Board.

The programs of the Kativik School Board must meet the standards prescribed by the Quebec Ministry of Education. However, the content and language levels have been adapted for Inuit second language learners. Due to the size of most schools, the small student populations, and the trilingual programming and staffing, most classes are multilevel, with two to three grades per class.

The Inuit culture and language are taught throughout primary and secondary school. The Board believes that balance can be achieved only if students acquire a strong base in Inuktitut before they move into second language learning. Research results from other parts of the world have shown that students who spend more time learning in the mother tongue achieve excellent academic results in both first and second languages.

The mission statement of the Kativik School Board, developed in partnership with parents, the communities and other education stakeholders, is *"to provide the people of Nunavik with educational services that will guide and enable all learners to develop the qualities, skills and abilities that are necessary to achieve their well-being and self-actualization."*

The Board's principles include: the right to education; Inuit control of Inuit education; culturally responsive curriculum; high achievement in education; flexibility to adapt to changing conditions; the need for lifelong learning; physical, intellectual and emotional development; and research as a basis for making informed decisions.

The overall objective is as follows: students are expected to acquire the knowledge and develop the essential skills and attitudes to become self-sufficient, valued and contributing members of their community.

Access to and Use of Learning Technologies

The whole experience with access to and use of the Internet has been disappointing. The first experience was with the establishment of three Internet centres, but the cost was too high. The second was with small-scale Internet services, but participation was low and the program was dropped. Currently, different programs are used by communities to gain access to the Internet. The few schools that are well connected to the Internet have also set up their own sites.

The School Board provides training to teachers on how to use different computer software for Web design, graphics design for Web pages, and animation. The training helps teachers understand how to teach students to build Web sites. Web design could be a career option; not having to move to Montreal to get a job is an incentive. The communities are starting to use the Web for design, transferring art via electronic media in order to market Inuit products and promote/preserve Inuit culture: Teachers use software to encourage students to learn and do their homework.

Youth are aware of the Internet and very interested because *"they view technology as brand new, exciting, fun"*; however, they don't use the computers for homework, as most students don't have computers at home. Access is limited to school hours—students don't want to come after school to use the computers. Computers are a novelty: *"If I like it, I will use it."* It is a question of time before students realize that the use and potential of computers goes beyond games. It will take dedicated and knowledgeable teachers to convince them how best to use computers for learning and career advancement. The older generation doesn't know enough about technology to make a judgement.

It is important to get teachers feeling comfortable with software/computers and able to evaluate the quality and pedagogical use of software provided. There are no curriculum guidelines for the software being used, for what needs to be taught. Teachers may have software they are not aware of, let alone know how to use for teaching and learning. The pedagogical teacher from the Kativik School Board travels to the schools on an as-needed basis to show teachers what software exists and how to use it.

For the most part, teachers use traditional methods of teaching. Younger teachers, in particular, use computers for teaching, while older teachers tend to be more reluctant/hesitant about using technology and applying it in the classroom—*"uneasiness about the unknown."* They don't want to look silly in front of the students, who may know more about computers than they do. Some teachers haven't been exposed to computers, so they don't know what is available or how to use programs/software to complement their teaching and reinforce students' learning.

Social Challenges

Schools in these communities face a number of social problems that affect learning in general and access to and use of technologies in particular. These include: discipline problems (misbehaving and acting out); lack of support from parents; low school attendance (students miss 30–40 per cent of school). Students' attitude is that *"school is not cool."* Parents want the best for their children but don't make the effort to get their children to school. In addition, they cannot help their children with school work because they don't speak English and/or French.

Those who go to school regularly because their parents care often don't want to be there and lack discipline. They don't see the value of education: they view being in school as fun and a social activity rather than for learning.

Another challenge is the religious influence (primarily evangelist) that appeals to superstition: "The world is going to come to an end in six months—what's the point of going to school?" People are very vulnerable to this kind of influence. How does one convince them that this notion is wrong?

A third barrier to school attendance is the attachment to traditional activities such as hunting. Some would rather be hunters than anything else—it is part of the culture. Parents have to decide what the priorities should be.

A number of students have birth defects and learning disabilities and exhibit serious behaviour problems; they require special education teachers, but the schools don't have enough. Teachers are overloaded with children's problems and are often not qualified to deal with them.

The technology-training teacher regards social problems *"as a much more fundamental aspect that needs to be addressed before technologies can be used as tools for learning/education."* Children who haven't eaten or slept well view technology as being at the bottom of their priority list. The School Board provides the technology to facilitate learning—but the environment is not conducive to learning, let alone the use of computers and learning technologies.

The Future of Learning/Education and Technology

What would facilitate the use of learning technologies? Raise teachers' awareness and appreciation of the use of computers, of what's available and how to use it. The right infrastructure has to be in place: poorly equipped schools should get an allotment to buy the computers they need. Staff must be determined, dedicated and interested in having access to learning technologies.

What would impede the use of learning technologies? Even if one overcomes the cost constraint of having computers at home, one still needs to address the lack of proper space and the maintenance of complicated equipment. Often schools buy computers and software programs that are not compatible, that don't provide continuity. Students' lack of interest in schools needs to be overcome, as well as the problem of teacher retention. There is high turnover (after a two-year probation) of teachers who come from the south, because they have difficulty in adapting to the culture in the north and are lured by better teacher opportunities in major cities.

Barriers

- There is no fibre optic network.
- Speed of access to the Internet is slow; surfing is a slow and frustrating experience.
- Education/training about Internet access and use is insufficient.
- *"In the north, math and science are two courses that kids have trouble with—they are not natural subjects for them."* Some try harder, others quit.
- Some schools view computers as a novelty.
- New teachers are not aware of what computers and learning technologies are available and how they can complement classroom instruction.

Solutions

- Special funding has been received from the Quebec Ministry of Education to install DirecPC™ using satellite dish technology. This will be made available to the 14 community schools and will provide immediate/fast access to the Internet.
- An experimental project is being discussed to test a new satellite Internet communication system for remote schools and pedagogical applications.
- The school of Kangiqsualujjuaq seems to be the best choice, having a key criterion for selection—a school staff that is interested, reliable, cooperative, dynamic, experienced and knowledgeable about new information and communication technologies.
- Using a math program called "Math Trik" helps teachers to motivate students to like/learn and be excited about math and science.

- The experience of schools that use computers to their maximum potential can be shared with those schools that don't.
- School administration should provide leadership and vision as to what computers are needed to address the education and learning needs of students. The administration should instill curiosity and enthusiasm in the use of computers and learning technologies. The principal should encourage the use of computers for teaching the curriculum.

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3. Using Learning Technology to Promote Community Economic Development

Top Five Key Issues for the Fort Albany and Kashechewan First Nations

- ✓ Learning technologies prepare children better to face the outside world.
- ✓ Band members are able to enhance learning, connect and communicate with other communities, and preserve their culture and traditions.
- ✓ Limited access to the Internet is a huge challenge.
- ✓ Students' technological skills need to be developed to a level where they are comfortable using them for their course work.
- ✓ Access to computers and technology has given more people opportunity to enhance their skills and improve employment prospects.

"Learning technologies open up the world to the children—they are better prepared to face the outside world." (Economic development officer)

Context

The Fort Albany and Kashechewan First Nations are located in northeastern Ontario near James Bay. The community of Fort Albany is fairly isolated, with no access to the transportation highway and no access until recently to the information highway. Fort Albany has no high school, no post-secondary institutes, no libraries or research facilities. Youth have to leave the community to continue their education. Leaving families and friends and coping with social and personal problems have hindered the youth from attaining proper certification and academic qualifications. With the recent installation of Internet access (July 1998), the community hopes to address some of these challenges.

"Elders said that we have to teach our children about both worlds; need to teach them about the business world as well as the Aboriginal world, history and culture."
"Children can make a living in their community, and if they go to Toronto they won't be lost."
"Learning technologies open up the world to the children—they are better prepared to face the outside world." (Economic development officer)

The community plans to use the Internet and e-mail so youth can finish high-school and post-secondary education. By using technologies, Aboriginal children learn about their culture, beliefs and values, preserving their culture and language without being isolated. Learning technologies would enable community members to reach out to the world, communicate and do business.

One of the major challenges facing the community is limited access to the Internet. Fibre optic connection exists only up to Moosonee; there is need to hook up fibre optics to Fort Albany. There are only six telephone lines (installed by Bell Canada since 1998), providing access to the Internet for only a few people at a given time. If the community is connected through fibre optics, there will be unlimited access to the Internet. Infrastructure needs include assistance to get a fibre optic line from Moosonee to Fort Albany. This was to be combined with a hydro grid line in the Fall of 2000. There is also a need for equipment to hook up the community.

"We would like to do things on our own and make sure that the infrastructure is here to use" and to provide service and assistance to the community. Teenagers are using the Internet and e-mail to obtain information and prepare their school assignments.

The following are the priorities for access to and use of learning technologies:

- Creation of permanent employment
- A network of 12 computers in a community computer room that provides access to the Internet and e-mail
- Access to the SchoolNet to enable teachers to find information to prepare lessons and develop better curricula
- Computers for students to use to do course work (20 computers in school)
- Use by youth employment program co-ordinators: 78 children between the ages of 12 and 21 had a summer job to produce a video of the community by collecting oral history, experiences from community leaders, elders, members

Experiences in access to and use of learning technologies vary according to the individual using the technology, his (her) needs, etc. Most students are very comfortable with computers, have access to technologies at school but not at home. The school has access to the SchoolNet, and thus Internet access is free. One adult learner in the community is taking a business accounting diploma course in Timmins. During the first encounter, "the computer was strange, scary." It took her a year to start feeling comfortable with computers; now she is using the computer for word processing and spreadsheets—but still finds it difficult to use. The Northern College is planning a community literacy program to upgrade adults' math, English and basic computer skills. Thirty people have signed up.

Increased understanding and use of computers and access to the Internet have enabled people in this community to improve their education and learning.

Community economic development objectives are: to have a fully functional computer room with Internet/e-mail capabilities; to have local ownership of a system so the youth will be able to pursue education and follow and practise business world ideas; to have Shabotawon become prominent and regain traditional role as teacher and counsellor through the use of modern technology; and to use local resources to generate revenue.

The Community Computer Centre

Increased understanding and use of computers and access to the Internet have enabled people in this community to improve their education and learning, to connect and communicate with other communities, and to raise their knowledge and awareness and strengthen their culture.

There are 12 computers in the community computer lab and one server, and the computers are networked. There is a trained computer technician, who maintains the lab and the computers. The community pays $50 a month to the Internet service provider for 200 hours of monthly access through five telephone lines. There is no cable service provider for the community at present.

During the past year, two training programs making use of the computers in the lab were introduced. First, 12 people are taking a business administration course for a certificate offered by the Toronto School of Business. Second, 10 people are taking a computer applications course. The students' ages range from 20 to 50, and they are either employed part-time or unemployed. Instructors come from the Toronto School of Business. Students use computers for learning, for example, Excel spreadsheet and Word for accounting/financing subjects. Although their computer skills varied at the beginning, they have been helped by the computer lab technician and the instructors to build their computer skills to a level where they are comfortable using them for their course work.

Barriers

1. Access to the Internet network is limited. Only five of the 12 computers can access the Internet at the same time. This is a major constraint, as people use the Internet a lot for research needed for course work.
2. Access is only by phone lines, where the transmission speed is low.

Solutions

1. A satellite dish will provide faster and more extensive Internet access on a 24-hour basis.
2. There is a plan in place to string fibre optic cable on the transmission line poles in a few years and hook up the computers: this would provide faster and more extended access to the Internet, distance education via video, and tele-medicine.

Benefits

1. The computer lab is open to community members to access the Internet, prepare job applications, do course work and prepare report papers.
2. The Band office has been incorporated into the computer network, so there is greater interaction/communication between community members/learners and the Band Council.

Lessons Learned

1. It is important to carry out a needs assessment in the community and determine the services that the Band is going to provide to meet those needs. The Band should be asking: What software applications would we need in order to provide the services that would address peoples' needs? What do people and/or course instructors need in terms of computer applications, and what is the best price/quality hardware and software available (e.g., Microsoft Professional)? The Toronto Business School course, for example, includes

the use and application of Word, Excel, Access, PowerPoint and Publisher.
2. Ensure that the infrastructure is in place (e.g., space, power supply, wiring) for the number of computers that will be used and the power voltage needed by each computer to facilitate the most efficient and effective use of the learning technologies and access to the Internet.
3. Either a satellite dish or fibre optic connection is needed to get all computers online and provide access to the Internet with expanded bandwidth. According to the computer technician, the satellite dish would cost $6,000 plus monthly fees. The fibre optic option is two to three years down the road.
4. A computer technician is required. The person must have the expertise to help select technologies that will meet the needs of the community in terms of access and computer applications as well as to maintain the computers on an ongoing basis.
5. A computer lab must belong to the community, be funded sufficiently and be managed by the Band. However, the Band has to work closely with the technician, instructors and learners to ensure that the hardware, software and computer applications meet the needs of the community.
6. There should be sufficient funds from the economic development department for replacement of hardware and software as well as for maintenance.
7. For the server, a bigger hard drive is needed; people must be trained in how to use the server so they don't change the configuration, which would slow the network down and could take the technician considerable time to fix.

Implications

If the community of Fort Albany has greater and faster access to the Internet, more people will use it for their education and learning. Computers and access to technology and the Internet have enabled a larger number of previously unemployed or underemployed people to upgrade their education and computer skill applications and improve their employment prospects.

Computers and the Internet have changed peoples' lives for the better. Aboriginal people are not inhibited by computers; on the contrary, they have been able to use them to their advantage for education and learning, to reach out to other communities, learn about others and strengthen their culture by expanding their knowledge and understanding of the outside world, Aboriginal and non-Aboriginal alike.

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4. Realizing the Innovative Potential of Technology in the Classroom

Top Five Key Issues for the Nisichawayasihk Cree Nation

- ✓ Technology skill is viewed as a foundation.
- ✓ Technology is viewed as one of many potential tools to facilitate learning.
- ✓ Learning opportunities offered by computer programs help to address the different ways in which students learn.
- ✓ Independent computer-based learning allows students to do remedial work, learn required skills and move forward with learning.
- ✓ Opportunities offered by technology contribute to a positive sense of potential.

" I really feel that [Nelson House] are front-runners in terms of technology use among First Nations." (Band council member)

"We have always been pretty innovative in a climate of change. This is partly due to the fact that our school board is not hard to convince—if they see [an initiative] as good for kids, they usually say 'go for it'." (Aboriginal educator)

Context

The Nisichawayasihk Cree Nation (NCN) has implemented initiatives to promote computer-based learning as a means of preparing students to participate in the economy. The NCN recognizes the importance of giving students the skills and knowledge to take advantage of economic and educational opportunities. The community has a real commitment to moving beyond dependency relationships and is working hard to build the capacity to create its own future. Socio-economic pressures have prompted community members to push boundaries: *"People are willing to try what others might not try, given our kids and community are high risk."*

Vision

The Nelson House Education Authority has been creative in exploring the possibilities offered by technology. Otetiskiwin School (Grades K–12) has benefited from having a dedicated principal to champion and drive the implementation and adoption of technology in the classroom. Technology skill is viewed as a foundation that underlies core curriculum areas such as math, science, language arts and social studies. Technology is also viewed as a means of attracting and retaining students, given their excitement about computer use.

Computers are in every classroom and are used to develop basic skills and competencies that students will use later in life. This positive philosophy emphasizes teaching students to *"think critically first and then use technology."* The school also operates on a project-based spending model. Resources are allocated to projects that have been identified as having a purpose as opposed to indiscriminately purchasing technology without a defined vision and objective for its use.

Initiatives

In 1996, the Grade 9 communications class began learning graphic design skills and applied their expertise to building an Industry Canada Aboriginal Digital Collections Web site about Indian treaties (http://collections.ic.gc.ca/treaties/code/). Building upon this experience, three female students began a small business called Wacky Graphics, which was housed in the school and provided local graphic design services. Over the next four years, these students designed client-contracted products such as calendars, funeral brochures and community election ballots. Revenues were paid to the school, which then paid the students market rates after deducting printing costs. This initiative helped to foster their entrepreneurial spirit and provided them with marketable skills and experience to potentially apply upon entering the workforce after graduation.

"Being able to do research through the Internet makes [students] more focused, as they are researching areas they are interested in. This is especially important when we don't have a library." (Aboriginal educator)

"The beauty of the system is that students can stop and then pick up where they left off. This is especially important in our community, where social issues often impact on a student's ability to attend class." (Aboriginal educator)

"Students get the point...that there is money to be made in this area if they have the right skills." (Band economic development officer)

Students are also using computer applications such as Inspiration.com to learn how to visually represent their thoughts. This program allows students to draw mental maps when brainstorming and to structure their thoughts in both hierarchical and relational ways. The learning opportunities offered by such programs help both to address the different ways in which students learn and to show students that there are multiple and equally valid ways to depict their thoughts.

The school recently opened a Community Access Project site in the library. The goal of the CAP site is to provide community members with access to the Internet. A partnership-based initiative, the project is receiving funding from Industry Canada over three years for development and maintenance. Objectives of the project include:

- providing community members the opportunity to obtain the skills and knowledge they need to electronically link to services and programs to enhance their economic and social well-being;
- helping to promote public awareness of the benefits and opportunities of using information technology and services;
- helping community members to become better informed through the exchange of ideas and information; and
- increasing the number of people in the Nisichawayasihk Cree Nation accessing and using the Internet.

The school has developed a portal Web site, (http://www.nhea.nelsonhouse.mb.ca/okschool.html), which provides an overview of the school, students and local community. In addition, the site features hyperlinks to education and financial resource sites of interest to members of the community. Embracing the potential of the Internet, the school has established an e-commerce page where individuals can contribute funds to the student council through online purchases of products.

Students need to "think critically first, then use technology."

In addition to the Otetiskiwin school initiatives, a Pathfinder Learning Centre was created in 1997 to offer independent and self-directed learning for Grade 9–12 students during the day and adult education courses during the evenings. The Centre is housed separately from the school and allows students to work on course modules designed by the Open Learning Agency.

The benefits and challenges of the computer-based learning approach are evident to the Centre staff. Motivating students to show up for class is often difficult, given social and family issues. The lack of visible employment opportunities makes it difficult to convince students of the value of the skills once their program is finished. Other challenges include the need for many students to back-fill their skills and knowledge, as many do not have the level of knowledge that their grade levels require. The independent computer-based learning process allows these students to go back, learn the necessary skills and then move forward with their learning. A clear benefit of the program is the promotion of "mastery-

based learning." Students are required to learn 100 per cent of the curriculum—no content is missed or left out due to absence or lack of teaching time.

A Transition Year Program was set up in 1995 to prepare students for post-secondary schooling. The majority of students have been out of school for some time and are striving to reintegrate themselves into education. The challenge for educators is to bring student skill levels up to what will be required for post-secondary study. In addition to basic reading and writing skills, computer literacy is a core focus of the program. Students are required to research and prepare academic research essays using the Internet and basic word processing packages.

> *"The key is to get people motivated. Once everyone becomes more educated, other benefits will accrue from it."* (Aboriginal administrator)

> *"We are thinking down the road. All we will need is a PC and video camera to do video-conferencing."* (Aboriginal educator)

Challenges

For Nelson House, the lack of reliable technical support and a fast Internet infrastructure has severely affected the delivery of current programs and planned future initiatives. Otetiskiwin School has relied on internal ingenuity to maximize the number of Internet lines through a "shotgun approach." This Internet connection is shared with the Pathfinder Centre, with unreliable connections and download speeds. For the Transition Year Program, which uses one dial-up telephone line for access, the slow and unreliable connection has directly affected the ability of students to research and write academic papers. Slow download speeds make researching a time-consuming and "barely tolerable" activity. Not only do students need to access the Internet for research purposes, but teachers are also required to do research to be able to critically assess individual student papers. This increased pressure on a narrow Internet connection makes it "almost impossible" for both student and teacher to obtain the information they need.

The opportunities offered by technology contribute to a positive sense of potential.

Solutions

The community has approached challenges by remaining solutions-oriented. Technology is viewed as one of many potential tools to be used to facilitate learning. Accordingly, technology is adopted where it works best and where resources and infrastructure exist to support it. Where technology has been implemented, issues have arisen around the changing relationship between teacher and student imposed by learning technologies. The shift of a teacher's role from content provider to information facilitator has threatened those teachers who view themselves as content experts. The key issue is to identify how teachers see their role: *"If [teachers] see their role as just to fill gaps, then they are not really making the best use of the technology. It is important that our teachers move beyond traditional teaching methods and act as facilitators of learning. Good teachers do it."*

The lack of local technical support has also led to home-grown solutions. Otetiskiwin School is looking at the feasibility of developing in-house troubleshooting skills. The objective would be to identify students who are really interested, offer them credit as an official course, and get them to act as "techies." This approach was tested in 1999 when a student was tasked with undertaking basic technical support in the form of loading software and wiring the local Ethernet. The potential benefits are evident: on-site support for technical problems in the school and skills development for the student.

Future Directions

The opportunities offered by technology contribute to a positive sense of potential. Community members are looking towards "what we can do" once sufficient infrastructure and staff skills are in place. Educators stress the need to develop courses that are "locally relevant but outwardly useful." The emphasis needs to be on the development of basic competencies that build community capacity and also open up opportunities for economic development through skills transfer. An innovative option is to offer a training course through the locally broadcast television channel. This program would cover off all the basic computer skills and would focus on helping those community members who "are scared of computers."

Otetiskiwin School realizes the possibilities offered by faster Internet connections. Video-conferencing with other schools represents a potentially valuable means of exposing students to other cultures and communities while at the same time building pride in their Aboriginal heritage. The community has also identified the need to bring in role models or mentors so students can "see what the opportunity options are." This is especially critical in a community where opportunities simply do not exist. Building awareness is viewed as an important step in developing entrepreneurial vision and ultimately economic development.

5. Building Community Connectivity Through Partnership

Top Five Key Issues for the Meadow Lake Tribal Council

- ✓ Investment in learning technologies is important to the delivery of quality education.
- ✓ Computer-based learning is in many ways the purest form of teaching.
- ✓ Learning technologies give students the basic skills and experience needed to become employed.
- ✓ Geographic isolation is a huge challenge.
- ✓ Schools are looking for creative sources of funding, including developing partnerships with corporate donors.

"Now, everything is so technology-based. Exposure to computers and access to information is essential. It also helps to broaden students' perspectives on what else is out there." (Council administrator)

"The Headwaters Smart Communities Demonstration Project will provide northern Saskatchewan with the tools to participate as an equal partner in the global community and to reach the opportunities that create a better future." (Economic development officer)

Context

The Meadow Lake Tribal Council Department of Education recognizes that investment in learning technology is important to the delivery of quality education. It has identified, developed and implemented numerous initiatives that are building a strong foundation for Aboriginal participation in the northern Saskatchewan economy.

The Meadow Lake Tribal Council (MLTC) is a positive example of how First Nations communities are working together to promote and advance the integration of learning technologies and strategies into teaching, training and curriculum development. The MLTC is "owned" by the nine individual member communities that come together to form the council. While each community is responsible for determining what technologies are appropriate and feasible for its specific schools, the MLTC acts as a linking and supporting body regarding policy development, program evaluation and funding.

Initiatives

In this capacity, the MLTC has entered into a partnership arrangement with the Keewatin Career Development Corporation to develop an Industry Canada Smart Communities Demonstration Project. The objective of the Headwaters Project is to *"provide information and communication technology services to remote communities throughout northern Saskatchewan."* This $13 million project will receive $5 million funding from Industry Canada and $8 million from the northern Saskatchewan community and educational partners (including MLTC).

The cornerstone of the project will be the establishment of Community Access Centres (CACs) in 40 northern Saskatchewan communities, including six MLTC communities. These CACs will use the Internet, with access provided primarily through high-speed satellite connections currently provided through DirecPC™ (an Industry Canada funded initiative). The project has a distance education component and will offer online credit secondary and post-secondary courses as well as developing a regional learning network. As outlined in the Headwaters Project Business Plan, the "promise of information and communication technology for remote communities such as ours is that our geographic isolation from the rest of the world will no longer be detrimental to our ability to educate ourselves, to do business, and to access services."

Makwa Sahgaiehcan is one MLTC community that illustrates how learning technology can be effectively applied. The Makwa Sahgaiehcan school's commitment to embracing the advantages of technology is made explicit on the front page of their Web site.

"Our school offers a variety of individualized computer-assisted instruction to meet the individual needs of each and every student. We have a modern facility with a range of environments designed to allow every student to succeed to the best of their ability."

"We are seeing great gains: on average, an increase of 1.5 grade levels over the course of one year (at 30 min/day)."

"While the high cost of technical support services is not prohibitive, it is an important cost of doing business."

(Aboriginal educator)

In 1999, the school installed new I-Mac computers in classrooms to act as "learning centres." These computers are networked by a G-4 server, which connects them via a wireless network. The school has integrated the SuccessMaker software package into the learning process. Students use the software for self-directed learning and are able to undertake individualized study for 30 minutes per day. Using this software has had a positive effect. Students who were previously behind in class have the opportunity to catch up and to

develop a solid foundation of knowledge to apply in their current studies. The impact of technology in the classroom is evident to teachers: *"Computer-based learning is, in many ways, the purest form of teaching. The computer manages the student's level of development, while the teacher becomes more of a facilitator, mentor and instructor."*

The school has developed the capability to link the computer network to televisions in each classroom. The computer teacher has been able to teach lessons while students remain at their own computer stations and watch the lesson on TV. In addition, every student has an e-mail account, which allows teachers to send lesson plans to them through the Internet. In 1999, the Grade 11 computer class built the school Web site (http://www.sasked.gov.sk.ca/~makwa/msfns.html) and individual Web sites and integrated pictures taken with a school-bought digital camera. Having these cameras has also helped to give the school a higher profile in the local community: *"Before, a reporter would have to come into town and take pictures. Now, it is easy to use our digital camera at school events and send the file to the Meadow Lake newspaper."*

In 1999, an innovative school program on film and video production funded by the MLTC was offered. This locally developed class was offered to four Grade 12 students, who were given access to top-line digital film equipment. A $25,000 video camera was purchased by the MLTC and loaned to the program. The MLTC hired a video production expert to come into the school and teach the students. The class produced a 10-minute video from eight hours of shooting footage. *"This experience gave the students great experience for the job market. They now know what opportunities exist and have the basic skills to become employed."*

Challenges

For MLTC communities, geographic isolation is a huge barrier. Internet access is available only through DirectPC (there is no local ISP), which often has technical problems and slow download speeds. It is anticipated that the investment in the Headwaters Project will have a beneficial impact on community connectivity to the Internet. Also, the majority of council communities are accessible by poor roads or by air only. Both of these means of access require significant commuting time and expense, and it becomes a significant challenge to bring in qualified technical support to troubleshoot computer problems. The high cost of support (upwards of $1,000 per day) makes it difficult for schools to make a commitment to computer-based learning.

Lack of financial resources makes it difficult to maintain existing computer systems and to keep up with technological advances. System upgrades typically use up a large proportion of the annual budget, with few funds left over for software purchases and technical support services. Schools have dealt with this challenge by undertaking "rolling upgrades," with some computers retired and replaced every year.

"Corporate partnerships are a possibility. We would be very open to this....any help would be great." (Aboriginal educator)

"The promise of information and communication technology for remote communities such as ours is that our geographic isolation from the rest of the world will no longer be detrimental to our ability to educate ourselves, to do business, and to access services." (Band administrator)

Schools want to develop partnerships with corporate donors.

Starting up an adult learning program faces a barrier in that there is no funding through federal programs for adult students (funding is available only for students up to age 21). Another difficulty is lack of physical space—there is simply no place to house adult learners and the technology they would require.

Solutions

To address the challenge of adequate financing, the MLTC has taken the unique step of creating a Program Enhancement position. This individual is tasked with tracking down sources of funding for all MLTC programs (including education and technology) and writing proposals. These funding proposals help to supplement regular sources of funding in the normal operating budget. In the MLTC's experience, sources of funding are "quite accessible. Once you do the leg-work and track these sources down, there is money available." Proposals in development include targeting Industry Canada's SchoolNet and Human Resources Development Canada's Office of Learning Technology. Individual schools are also looking for creative sources of funding, including the potential for developing partnerships with corporate donors.

At the community level, Makwa Sahgaiehcan is looking at how to increase community access to computers. Specifically, the school is looking to develop computer-based adult education programs. This is especially important as *"more adults will realize they need an education. If we don't have a program for them, then they will just drop out of society."*

6. A Leadership Approach to Using Technology in the Classroom

Top Five Key Issues for the Montana First Nation

- ✓ It is important to give students exposure to technology at the earliest age and to provide a supportive environment that enables older students to make use of technology whenever necessary.
- ✓ Leadership and vision are needed when developing a technology strategy.
- ✓ Teachers, not technology, are the most important part of the classroom.
- ✓ Using learning technologies will give students the skills to compete for jobs and to develop business opportunities.
- ✓ Partnerships with companies might open up opportunities in technological areas where barriers are otherwise too great.

"Success of technology depends not on how old or new it is, but on how it is being implemented and used." (Aboriginal educator)

"Students need to have the background in order to be able to understand and appreciate what the [employment] opportunities are." (Aboriginal educator)

"It is critical to have involvement from the inside, from people in the community." (Aboriginal economic development officer)

Context

A major focus of the Montana First Nation in recent years has been on education and strengthening the role of technology in the classroom. Community educators recognize the importance of giving students exposure to technology at the earliest age and providing a supportive environment that enables older students to make use of technology whenever necessary. The community recognizes that technical skill enhancement is intimately tied to the ability of community members to gain employment: *"Computers come in the middle of everything, regardless of whether you are a computer technician or not."*

Educators are quick to point out the need for leadership and vision when developing a technology strategy. It is important to have technology in place, but emphasis must be placed first on achieving "outcomes." To the school, this is fundamentally a strategic design issue. It is not enough to use money to buy computer equipment and put it in the school. It is crucial for educators to undertake actions that will deliver an outcome. The key to success is having a "technology plan." Equipment purchases and curriculum design must be oriented around how they will help students achieve their goals. To this end, the school has adopted a three-year performance assessment cycle. Programming is evaluated to make sure that the school is not just implementing technology but also helping to develop students for results. Based on this evaluation, if students are not at the desired level of performance, then refinements are made to the strategy.

Initiatives

The *Meskanahk Ka Nipawit Community School* was built in 1996. Students in the K4–9 school receive basic exposure to computers in kindergarten and continue to receive hands-on computer instruction up until Grade 9. From a learning perspective, teachers feel that it is *"good to introduce computers at the beginning level. Kids respect that."* Students receive instruction in computer basics such as keyboarding, word processing and graphic design. Each classroom has a computer with educational games for students to play. Teachers find that computers can be used as a reward mechanism to encourage students. Students are rapidly adapting to technology. They have developed a variety of skills and are willing to explore on the computer. For teachers, the most important thing is to ensure that kids enjoy using the computers. *"If they enjoy it, they will keep doing it."*

The Montana First Nation has been creative in addressing the challenge of connecting to the Internet. Prior to 1999, access to the Internet was via modem dial-in. The school used a DirecPC™ station and satellite dish provided by Industry Canada. However, the dish did not meet expectations, as it was regularly out of service. In addition, the PC configuration allowed only one station to have access to the satellite connection. To upgrade from the one station to a network would have cost the school thousands of dollars for software, an expense that it could not afford. In response to this problem, a 45-foot radio tower was built to allow for wireless transmission. The band council paid for the construction, and administrators negotiated with Wetaskiwin Telephone to provide the school with Internet access for only $150 per month.

"Technology is important. It is critical that we 'get with the times.' We always have the feeling that we are a step behind where the technology is at." (Aboriginal administrator)

"The teacher is the most important part of the classroom. It is essential that the correct leaders are hired." (Band administrator)

Keeping up to date with technology is a fundamental concern for the school. It tries to ensure that *"kids are on*

top of things" by continually bringing in new equipment. To do this and to avoid big one-time costs of upgrading, the school budgets the cost of capital expenditures on a yearly/rolling basis.

The community also realizes the importance of building its technology strategy around strong technical expertise. To this end, the community has partnered with Intellinet Solutions to provide technical support within the school one day per week. Intellinet works with the community to identify the various technology options and the infrastructure best suited to meet current and future needs. The company also provides expertise to make sure that technology is *"aligned with and leverages against existing systems."*

The school recognizes that teachers, not technology, are the most important component of the teaching equation. The school is wiring teacher computers into a school network to help facilitate the teaching experience. Trevlac, a student information system, is being imple-mented. All teachers, through computers on their desks, can do attendance and grading while also having access to files and other resources. Sharing information over a network allows teachers to spend more time on what is important: facilitating a student's learning experience.

Challenges

Money is the biggest issue. The rapid pace of technological change means the community is constantly looking to replace, improve and upgrade existing equipment. The way federal funds are allocated to the band is also viewed as part of the challenge. For example, the band would like to offer adult computer courses to unemployed band members. The difficulty is that many band members live beyond walking distance and cannot afford transportation to classes. In an Alberta winter, the availability of transportation becomes a critical consideration. While the band would like to offer such transportation, it is constrained by a funding system that is not amenable to such issues. In this instance, the difficulty for the band is that while the cost of fuel and hiring a driver are eligible expenses, the capital cost of purchasing a vehicle is not. Students who might otherwise attend classes and upgrade their skills are thereby faced with an additional barrier.

The community realizes the importance of building its technology strategy around strong technical expertise.

Other barriers include a history of dependency and lack of entrepreneurial mindsets. These social/attitudinal barriers are so deeply embedded in the community that they will be difficult to overcome. They need to be addressed in a systematic fashion, enabling students to see that using learning technologies will give them the skills to compete for jobs and develop business opportunities.

> *"Success of technology depends not on how old or new it is but on how it is being implemented and used."* (Aboriginal educator)

Looking Forward

Future initiatives include sending principals and teachers for training on how to use technology for education. This training would help them to see if the technology fits in with the program vision and objectives and if the technology orientation is meeting expectations. It will become increasingly important to bring in teachers who can teach courses that develop marketable skills, such as multi-media and computer-aided drafting and design (CADD). In addition, having more technical skills might enable the school to offer distance-based instruction to students in grades 10 to 12 who are currently schooled off-reserve. The ability to offer distance classes for students living at home is a potentially valuable way of keeping youth in school while also building community technological capacity.

The school has also identified the potential for partnering with companies. Although the school has not approached any company to date, it realizes that there may be opportunities for companies to help by sponsoring students and activities. Such initiatives would also benefit students by helping them to develop their communication skills. The problem of a lack of entrepreneurship on the reserve might also be addressed by corporate sponsorship. *"An individual needs to feel that he/she can create [economic opportunity] on his/her own"* and not wait for the band council to do all the work. Partnering might help to open up opportunities in technological areas that otherwise offer too great a barrier.

7. Technology as Part of a Holistic Approach to Education and Skills Training

Top Five Key Issues for the Musqueam First Nation

- ✓ Technological skills alone are not enough—individuals need to know how to read, write, take care of themselves and interact with society.
- ✓ Technology is used as a tool to promote the preservation of the Musqueam language.
- ✓ Learning technology challenges include lack of building space, absence of qualified technical support, and the rapid obsolescence of technology.
- ✓ The community is looking to develop programs that leverage the drawing power of technology.
- ✓ There is a recognition of the potential for economic development spin-offs resulting from technology programs.

"By combining academics with training, the program is more interesting...not just the monotony of pure academics." (Aboriginal educator)

"Realistically, we can't see a student sitting in front of a computer all day. Our approach is to give people the skills they need to find work." (Aboriginal skills trainer)

Context

The Musqueam First Nation has approached the use of learning technology from a holistic perspective. Developing computer skills is seen as an important component of an integrated approach to helping community members make the transition from welfare to work. Yet technology is not viewed as a panacea for existing problems—rather it is viewed as one skill set among many that need to be addressed if community members are to develop and take advantage of economic opportunities.

The focus of Musqueam First Nation education initiatives is on adult learners. Youth in K–12 receive off-reserve schooling in the non-Aboriginal urban community. Learning technology is employed on the reserve to give adult learners basic computer skills as part of a comprehensive training program designed to enable their transition from *"social assistance to self-sufficiency."* Adult education programs are a pragmatic response to the challenge of high unemployment (ranging from 50 per cent in the summer months to 80 per cent during the winter) and the need to create employment. The overarching goal of educational initiatives is to get unemployment levels down to the national average by providing members with realistic opportunities.

Initiatives

The Musqueam Education and Musqueam Employment Readiness departments addressed this challenge by combining their resources to develop an innovative approach that blends academic studies with practical, hands-on work skills training in running a small business. In 1998, the Adult Learning Centre joined with the Qey Sta:m Café Training Centre to offer a restaurant training program to First Nation members between 17 and 29 years of age.

Given the high-school dropout rate (up to 50 per cent), it is critical that programs exist to provide young adults with opportunities. The program has four main components: employment skills, personal life skills, basic academic skills, and restaurant/food service management skills. Basic computer training forms part of the academic component, with the intention of providing students with the skills needed to find employment or to make a smoother transition back to school. *"We are registering equal numbers of men and women and attracting individuals who up to now haven't seen themselves entering an academic program or who have been unable to maintain an attendance level sufficient to make any noticeable progress."*

Musqueam First Nation in Brief

- ✓ Location: ..... Vancouver, British Columbia
- ✓ Population: 1,060
- ✓ Educational achievement:
  - Grades 9–13 ..... 32%
  - Secondary school graduation 36%
  - Non-university education 19%
  - University education 42%

"Programs like this help to target kids at risk. Technology helps to attract them in." (Aboriginal educator)

The critical success factor has been the ability of the program to bring together academic, employment and personal skills training with the hands-on experience of running a small restaurant. The Musqueam First Nation recognizes that a fully supported education program is necessary if these skills are to be developed and if community members are to break free from a world of dependency and move towards self-determination. Developing technological skills alone is not enough—individuals need to know how to read and write as well as how to take care of themselves and interact with society. The practicum component is attractive to students, as it allows them to *"feel like*

they are moving forward by having more tangible experiences." The net effect has been increased enrolment and retention levels over the past two years.

The program is unique in that it is designed to be culturally sensitive. This means building a bridge between traditions and training, such as preparing foods for traditional potlatch gatherings. Program coordinators recognize that some community members retain strong values for traditional practices and that without this bridge some members would not participate and gain the benefits of skills training (including computer skills). In effect, the program helps to maintain cultural values without leaving out the academic component.

The Adult Learning Centre also promotes the use of technology in the broader community by providing computer access and tutoring services to K–12 students during the evenings. In a community where computer penetration in the household is extremely low, the ability to type and print essays allows students to prepare professional-looking assignments that equal those of non-Aboriginal classmates.

Technology is also used as a tool to promote the preservation of the Musqueam language. Two initiatives have been developed in coordination with the University of British Columbia to encourage sharing and learning of the language. Language classes are offered, with third-level students required to build a Web page. These Web pages are intended to act as a tool whereby others can learn about their language. In addition, the community has developed a computer database to store oral recordings spoken by an elder. An invaluable "Word of the Day" program has been created that allows students to obtain access to these recordings via a user-friendly graphical interface. This program is available for access via a computer in the Band administration office and can be accessed by any community member during working hours. The program provides a forceful example of how technology can be used as a mechanism to protect and promote Aboriginal culture and tradition.

The Musqueam First Nation recognizes the potential for economic development spin-offs resulting from their education programs. One potential market is technology-oriented businesses, such as multimedia and graphic design. A couple of community members have already begun to offer such services, and the potential exists for many more to develop entrepreneurial businesses in this field.

Challenges

The gap between vision and reality is widened by basic issues such as lack of building space to house additional computers, absence of qualified technical support to troubleshoot problems, and the rapid obsolescence of technology. Compounding these problems is a pressing social challenge: the lack of adequate childcare services on-reserve. Many students are unable to participate in the training program simply due to the fact they are looking after their children at home. The implication is that, regardless of the level of technology in the curriculum, the ability of community members to develop skills and spin-off businesses is being limited by a basic systemic issue such as childcare.

Looking to the Future

The community recognizes that developing technological skills will enable community members to compete actively in the marketplace. *"Computers are everywhere in the business world."* Given additional financial resources to address some of the challenges, the band has identified potential opportunity areas, such as the development of graphic design and advertising businesses. With the appropriate skill sets, community members could exploit comparative advantages in niche markets, as they would have a *"very marketable product—a First Nation product."* The community is also examining options for developing solid and reliable technology support. When this barrier is overcome, there are plans to offer more technology-oriented courses to students.

The community is looking to develop further programs that leverage the drawing power of technology.

The community is also looking to develop further programs that leverage the drawing power of technology. In their view, technology is an important means of attracting and retaining youth in school. The community feels it is highly important to provide high-risk students with access to technology that interests them and the opportunity to develop skills that will enable them to find work.

8. Plugged In: Leading the Way in Northern Internet Connectivity

Top Five Key Issues for Haines Junction and the Champagne and Aishihik First Nation

- ✓ Technology is viewed as a tool to work with in conjunction with skills development.
- ✓ Technology will help the community to meet its goal of developing "modern thinkers."
- ✓ Distance-based education is considered to be a supplement to, as opposed to a replacement for, orthodox ways of teaching.
- ✓ Gaining teacher and student acceptance of new technology is a challenge.
- ✓ There are varying perspectives within the community on the value and use of technology in teaching.

"Technology is a tool to work with in conjunction with skills development and to help expand [students'] knowledge base." (Aboriginal educator)

Overview

Haines Junction is actively striving to be at the forefront of learning technology use in the Yukon. Educators at St. Elias Community School and the Yukon College campus are developing solutions to local learning challenges, such as using distance education as a complement to traditional teaching methods. They are also seeking ways to maximize the benefits of government–private sector investments in high-speed telecommunications infrastructure. Success is supported by a community that realizes the positive potential of technology and encourages computer use and training to give students a strong foundation to enter the workforce.

Objectives

Community educators want both Aboriginal and non-Aboriginal students to be "modern thinkers." Technology is everywhere in the workforce, and students need to be computer-literate to gain employment. This perspective is reinforced by community members who emphasize the importance of having their children use computers. Meeting the goal of developing modern thinkers is facilitated by First Nations members' ability to deal with technology and their high level of patience when learning how to operate computers.

Initiatives

With a population made up of 50 per cent Champagne and Aisihik First Nation members, Haines Junction considers itself to be one of the most advanced rural and Aboriginal communities in the Yukon with regard to technology adoption. In fact, it considers itself to be *"pretty progressive on technology, better than 99 per cent of communities in Canada."* The community has benefited from being located along the Alaska Highway. As part of the Yukon territorial government's Connect Yukon Project, every community along the highway has or will have high-speed Internet through fibre-optic connection. The community also enjoys low-cost access to the Internet, as connection costs are covered by the territorial Department of Education.

Connect Yukon Project

The project is a cost-shared joint initiative of Northwestel and the Government of the Yukon and is designed to improve the telecommunications infrastructure throughout the Yukon Territory. All K–12 students at St. Elias Community School have full Internet access. There is a low 2:1 student/computer ratio in the school, ensuring that students have ample access to the technology. The school attempts to keep current with evolving technologies; the oldest computer in the school is three years old. Every classroom is equipped with a computer pod that has Internet access. Students can receive group instruction in the computer lab or undertake individual remediation and catch-up studies on classroom computers.

> Embracing new technologies can mean a dramatic departure from traditional methods of teaching.

In 1998, the school piloted a distance education course in conjunction with Watson Lake. This Yukon-based IT course was delivered to Grade 11/12 students via the Internet. Fifteen students participated in the pilot project, with tremendous school and community support. Importantly, delivery of education via distance-based distribution mechanisms is considered to be a supplement as opposed to a replacement for traditional ways of teaching.

As part of the Champagne and Aishihik First Nation's Final Agreement, an education and training plan has been developed. The local Yukon College campus has been actively involved with First Nation training and course delivery, either through direct contracting or public offerings. Almost 80 per cent of training courses are de-livered to First Nation members. Within these courses, computers make up a significant and integral component of training

program delivery. Courses include a one-week training course in basic computing, as well as Microsoft training and graphic design workshops. There is also an on-campus Community Access Centre where students can connect to the Internet. The main purpose of Yukon College course delivery is to *"help adult learners get a job and develop the economic base of the community."*

An 18-week Youth Employment Training Program also provides students with the opportunity to develop technological competencies and skills. Funding for the program is provided jointly by the Yukon Territorial Government and HRDC. Four weeks are spent in the classroom and fourteen weeks in a work placement. Access to and training on computers is an important component of the classroom study.

Challenges

Unlike many other communities, Haines Junction is not limited by insufficient finances or inadequate technological infrastructures. Rather, their main challenges have a social dimension. The distance education course piloted in 1998 had both supporters and detractors. Most students supported the concept and appreciated being able to work from home and communicate and collaborate electronically. Other students were not as comfortable with this electronic approach to learning. These students missed the social context of the traditional classroom and would have preferred an approach to learning that allowed them to move along at the same speed as other students.

Gaining teacher acceptance of new technologies is also a challenge. For many teachers, embracing new technologies can mean a dramatic departure from traditional methods of teaching. Some educators prefer to build student knowledge and skills through traditional, lecture-based methods and are hesitant to utilize the new ways of teaching that technology affords. Other teachers are more holistic in approach and are willing to use whatever technology can offer in order to build *"creative thinkers for the future."* At the secondary level, there is high acceptance of the benefits of technology. Technology adoption becomes more of a challenge at the primary levels, as there is less of a tradition of technology-based teaching for young students.

Educators cite cultural pressures as challenging the achievement of technology's benefits. Within the community, there are varying cultural perspectives on the value of school-based education and the use of technology in teaching. Some members regard technology as a reinforcement of the dominant culture and a contribution to the erosion of traditional values, culture, heritage and language.

Educators at both the K–12 and adult training institutions are eager to maximize the potential of learning technologies.

Building a Base for the Future

Educators at both the K–12 and adult training institutions are eager to maximize the potential of learning technologies. For St. Elias Community School, this means finding the time to train someone in the community to provide technical maintenance and trouble-shooting assistance. This will help to supplement the Department of Education crew that is currently overburdened and unable to provide regular support. For the Yukon College campus, maximizing technology means moving into online, distance-based education. Provision of more main-campus courses to satellite campuses will enhance rural students' learning experiences. It will also help to make students more comfortable when making the transition from satellite to institutional campuses. Through online distance education, students will be able to develop a greater knowledge base while learning in a familiar setting and will be better prepared to make the leap to the larger campus.

9. Strengthening a House of Learning by Using Learning Technology

Top Five Key Issues for the Kwanlin Dun First Nation

- ✓ Technology is viewed by educators as a means to close gaps and address important community issues.
- ✓ Technology needs to be looked at from a First Nations perspective.
- ✓ Technology use should reflect First Nation goals, values and traditions.
- ✓ Finances, training and technical support are all intergral components of an effective learning technology strategy.
- ✓ The Internet is an important medium for delivering curriculum and instruction.

"Technology can be seen either as a gap or as a bridge. We see it as a bridge." (Aboriginal educator)

The Kwanlin Dun First Nation (KDFN) is looking at ways to integrate technology into community-based learning programs. The community's House of Learning is not only focusing on strengthening KDFN member and beneficiary educational experiences but is also looking to strengthen other communities through sharing of knowledge. Education, technology use, social empowerment and economic development are viewed as complementary pieces of a holistic approach to community well-being.

Learning Technology Objectives

The community has "big ideas" about how technology can be used in education and skills training. Educators view technology as a means to close gaps and address important community issues. They are looking to design technology into education strategies to best meet the needs of the community, that is, to ensure that technology use reflects First Nation goals, values and traditions. This means looking at technology from the following perspective:

- Using technology to serve community members and meet their needs
- Developing content that is appropriate for Aboriginal learners
- Ensuring that technology is a tool for learning instead of a means to control First Nation people

Learning Technology Initiatives

The House of Learning has developed joint partnerships with Yukon College, Yukon Territorial Government Department of Education, and Department of Indian and Northern Affairs to provide funding for training and skills development courses. One of these courses targets youth (K–12) to work in science and technology camps. These skills training camps are held off-reserve within a traditional setting. Next year the community plans to further develop the technology component in the training. Learners will develop technical skills such as learning how to set up Internet Web sites. Doing so will not only provide students with valuable skills, it will also allow Kwanlin Dun to show other communities in the Yukon what they are doing, as well as communicate with other areas of the world.

The Education Department has nine computers available for public use. These are currently housed in a hallway within the Education building. KDFN members and beneficiaries can use the computers for word processing, e-mail and to browse the Internet. Currently, the Education building has the highest speed broadband Internet connection among the various departments. In October 2000, the band received 60 computers donated by the Bill and Melinda Gates Foundation to create a computer laboratory. As part of the funding, the lab will contain 11 new computers and a projection screen for training and education use. The department has plans to hire a technical support/network administrator to provide troubleshooting and maintenance expertise and is looking for a funding partner.

Technology needs to be looked at from a First Nations perspective.

A "Filling in the Cracks" program targets youth who have dropped out of the mainstream educational system. The drop-in centre has computers for students to use for remedial work. Although the technology in place is currently dated, the centre will be replacing the existing computers with the ones from the Education Department. Coupled with the computer upgrading are plans to create a technical resource support position.

Challenges

Beyond funding and technical support resource challenges, educators cite the difficulty of "trying to keep up with the train." This refers to the challenge of maintaining pace with software and hardware advances and with the technical skills associated with these developments. Within the KDFN, the knowledge base is quite limited with regard to technology. Training sessions and workshops are given to all departments in order to raise the overall level of community expertise. Raising overall levels of expertise builds community capacity and ability to meet the growing demand for technology-based services. Currently, there is a significant imbalance between the supply of technology expertise and the demand for associated services.

The KDFN also recognizes the need to perceive the issue of technology use as a continuum. Computer use does not exist within a vacuum. Finances, training and technical support are all integral components of an effective learning technology strategy. The inability to meet the requirements of any one of these components can have severe implications for the effectiveness of learning technologies.

Future Initiatives

Faster Internet connections open up opportunities for distance education and Web-based instruction. Yukon College is looking at ways to use the Web to deliver curriculum and instruction to satellite campuses. This will give local First Nation community-based students access to a larger number of course choices and should help learners who struggle and have difficulty adjusting within institutional settings. The community recognizes that partnerships with educational institutions are needed in order to strengthen their ability to deliver quality education.

The KDFN is looking to add technology as one of its core program delivery areas. It is also examining options for becoming a technology training facility for First Nations peoples across the Yukon. The goal would be to design technology courses that are sanctioned and certified by accredited post-secondary institutions (such as Yukon College). Developing a training facility would help KDFN become a revenue generator, as opposed to just delivering programs. The KDFN is also looking to negotiate ways to increase its control of how technology is integrated into education design and delivery. Educators say *"Let us control the technology so we can best deliver services to our community."*

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10. Using Distance-Based Learning to Link Communities Together

Top Five Key Issues for the Sahtu Divisional Education Council

- ✓ Technology provides communities with access to information and helps to overcome the challenges of spatial dispersion.
- ✓ Distance-based learning technologies allow students to receive quality instruction in their home communities and to complete high school.
- ✓ Financial resources are the biggest challenge.
- ✓ Schools need to keep pace with technology to ensure that students are using equipment that is level with current standards.
- ✓ Students are eager to use learning technologies.

"Students are able to exchange ideas and participate in problem-solving strategies with their age-peers, just as students in larger high schools have always done." (Educator)

Context

Small class sizes in the Sahtu region of the Northwest Territories have always posed a problem for course delivery. With the extension of grade levels in small community schools, debate has focused on the value of employing a teacher to teach only one or two students. These communities are now benefiting from the delivery and planned expansion of high-school courses via distance-based learning technologies. Students in isolated communities receive instruction from a teacher in Norman Wells via the Internet, while at the same time developing important computer literacy skills.

The GNWT Department of Education has identified technology adoption as one of the main objectives of its strategic plan, People: Our Focus for the Future—A Strategy to 2010. The Department is pushing forward with initiatives designed to maximize the benefits offered by technology. As part of the consultation phase of its strategy development, the Department asked students, parents and educators for their perspectives on the role of learning technologies in the classroom. Responses received include the following:

- *"Technology opens opportunities—computer literacy and comfort with technology."*
- *"[Computer Training Software] increases interest in school—resulting in increased attendance."*
- *"CTS provides incentive for more students to stay in school—allows student flexibility in course choices."*
- *"High-school students are now able to stay in their own communities—higher graduation rates."*
- *"Happier, healthy students and healthy community—community links the school to CTS."*

In 1999–2000, a distance education pilot project linked Grade 10 students in five Sahtu region communities (Aklavik, Hay River, Kakisa Lake, Norman Wells and Yellowknife) to complete the compulsory Northern Studies course through online (e-mail) and telephone learning. One teacher at Mackenzie Mountain School in Norman Wells was responsible for course content instruction, with delivery occurring through student e-mail accounts. Course content included PDF documents (textbook pages), as well as Web links. Students were also able to converse with classmates through a bulletin board discussion group. This forum allowed students to interact with peers, exchange

ideas and develop a learning community, just as students in larger high schools have always done.

> *"Technology will continue to influence student access positively and enable schools to offer a broader range of programs to students. It will also let schools adopt a much more flexible approach to how they deliver high school programs."* (Government official)

This distance learning opportunity is indicative of a larger trend. Over the past few years, the Government of the Northwest Territories has embraced technology as a means of providing communities with access to information and of overcoming the challenges of spatial dispersion. It has provided funding to upgrade the region's existing infrastructure through the launch of an integrated and coordinated pan-northern information network (Digital Communication Network), which provides high-speed digital Internet access to 15 major communities. This network provides a cost-effective means of ensuring community connectivity. Most communities in the Sahtu have not benefited from this initiative, however. Only Norman Wells has a local Internet service provider (ISP). All other communities are required to dial-in long distance to a remote service provider.

Slow Internet connectivity limits the ability of educators to use learning technology to its maximum potential.

Through the territorial Community High School Initiative, grade extensions have occurred in all of the communities participating in the pilot project. Students are now able to take courses up to Grade 12 in their home communities and do not have to travel to central communities to receive schooling. Grade extensions have benefited from the emergence of distance-based learning technologies, which have enabled students to receive quality instruction and to complete high school in their home communities. Students being able to stay in their home communities is viewed as a critical factor in increasing high-school graduation rates.

At the same time, the availability of more grades in each community has posed new challenges. Tight resources make it difficult for schools to have teachers for all courses. Some subject classes in the past have had students from a range of grade levels being taught by one teacher. For example, in one classroom five different types of mathematics were being taught at once. Access to distance learning technology shifts the role of the teacher towards acting as a resource person. The teacher is thereby better able to give individual students support when they need it rather than having teaching time spread too thin among students.

Challenges

Educators cite access to financial resources as the biggest challenge they have to deal with. Other challenges include the level of teacher turnover from one year to the next, which makes it tough for schools to maintain levels of technical expertise. Teachers are relied upon to pick up skills through self-instruction. *"The rate and level of pick-up is totally dependent on the skill level of instructors."* This absence of continuous qualified technical support is compounded by the challenge of large geographic distances between communities.

The one technical troubleshooter on staff is required to fly in to communities. In practice, this arrangement means outside technical support arrives at best once a month. Downtime due to technical problems negatively affects students through loss of study time, limited access to distance learning assignments and loss of ability to search for information.

Bandwidth is also a huge issue. Pipeline size depends on where a community is located and how large it is. Download speeds range from 64 kps in remote villages to 1 mb in Norman Wells. This disparity limits the ability of educators to use learning technology to its maximum potential.

Solutions

The Sahtu Divisional Education Council recognizes the need to keep on top of technological advances. It has a "rolling fund," established through a one-time surplus, and also annual budget allocations that allow schools to upgrade systems as necessary. This approach ensures that schools keep pace with technology and that students are able to use equipment that is level with current standards.

> *"[Students] are already primed to technology. The key is to make sure they have access to resources."* (Aboriginal educator)

The GNWT is building on the success of the pilot project and has signed a Memorandum of Understanding (MOU) with Chinook College and the Calgary Board of Education to allow NWT high-school students to take courses through online learning. These courses will be delivered through a friendly Web-based course management software platform called WebCT. WebCT offers educators a variety of tools that enable teachers to:

- develop a friendly Web-based interface;

- create easy-to-develop course content; and
- jointly develop more distance education modules.

This MOU offers a *"wonderful opportunity for isolated communities."* Students will be able to take a wide range of courses in subject areas that are currently unavailable (due to the lack of teachers in the communities).

Looking to the Future

Sahtu communities are looking to the future and developing technology strategies that will provide their children with skills necessary to participate in the economy. Educators realize that students are eager to use learning technologies, and they are working to provide access to resources. In 2001, a new Anik satellite is set to be launched. The school board anticipates that this development will help to address bandwidth limitations by providing high-speed Internet access. Recommendations also include encouraging the territorial government to *"buy more bandwidth,"* and to *"put in cache servers in Yellowknife to help decrease download times."*

Reference Sources

This section contains information sources identified during an extensive literature review of learning technologies and their application to Aboriginal education and skills training. While the section contains some academic references, its main purpose is to provide Aboriginal communities with a comprehensive and valuable selection of resources that can be referred to when developing and implementing learning technology strategies.

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United Nations, *Development and International Cooperation in the Twenty-First Century: The Role of Information Technology in the Context of a Knowledge-Based Global Economy*, Report of the Secretary General for the Economic and Social Council, 2000.

Aboriginal Education Mailing Lists

1stpeople. The 1stpeople mailing list was set up as a part of the First Nations SchoolNet Project to provide Aboriginal teachers, educators, curriculum developers, school administrators and consultants with a forum where they can share their experience, recommendations, questions, tips, tricks and almost anything else relating to Aboriginal education. Subscription information is available at http://www.schoolnet.ca/aboriginal/educators_circle-e.html

Aboriginal Learning Technology Initiatives (U.S.)

Aboriginal Digital Collections (http://aboriginalcollections.ic.gc.ca): Industry Canada's pilot program is a unique opportunity for Aboriginal Canadians to preserve, celebrate and communicate their heritage, languages and contemporary life by developing and accessing materials over the information highway. The program pays Aboriginal youth to create Web sites featuring significant Canadian Aboriginal material. The material can range from information on Aboriginal businesses and entrepreneurship to traditional knowledge and contemporary issues such as the preservation of Aboriginal languages.

Aboriginal Youth Network (http://www.ayn.ca): The Aboriginal Youth Network is a Web site designed by and for Aboriginal youth in an effort to create and maintain a unique online youth community nationwide.

Four Directions Project (http://www.4directions.org): This collaborative initiative is coordinated by the Laguna Pueblo Department of Education, funded by a Technology Challenge grant from the U.S. Department of Education and partnered with Intel and Microsoft. Implemented in 1995, the project has brought Internet and IT infrastructure to 19 rural Bureau of Indian Affairs-funded schools across the United States.

Aboriginal Scholarships and Bursaries

Aboriginal Scholarship and Bursary Guide, http://www.ammsa.com/ammsabursary.html

Foundations

Bill and Melinda Gates Foundation (http://www.gatesfoundation.org): In March 2000, the Foundation announced a $350 million three-year investment in a series of education grants designed to help all students achieve at high levels by improving teaching and learning and enhancing access to technology. Numerous U.S. and Canadian Aboriginal communities have taken advantage of this program to put computers into schools and improve Internet connectivity.

Government of Canada

CanConnect Skills Certificate (http://canconnect.ic.gc.ca/certificate/home-e.asp): The CanConnect Skills Certificate is an Internet-based motivational tool intended to facilitate the acquisition and demonstration of ICT ("soft" and "technical") skills and to promote the importance of these competencies. It is aimed at Canadian youth at the K-12 level of the learning system and can be used as a resource in both school and community-based settings. The skill sets reflect provincial outcomes where they have been articulated, and they are complementary to The Conference Board of Canada's *Employability Skills 2000+* profile.

Community Access Program (http://cap.ic.gc.ca): CAP aims to provide Canadians with affordable public access to the Internet and the skills they need to use it effectively. Under CAP, public locations like schools, libraries and community centres act as "on-ramps" to the information highway and provide computer support and training. In 2001, Industry Canada wants to establish public Internet access sites in up to 10,000 rural, remote and urban communities across Canada.

Connecting Canadians (http://www.connect.gc.ca): Connecting Canadians is the federal government's vision and plan to make Canada the most connected country in the world.

Federal Economic Development Initiative for Northern Ontario (FedNor) (http://www.fednor.ic.gc.ca): FedNor provides funding and services across Canada, with a focus on Aboriginal programming in northern Ontario. Since 1996, FedNor has allocated $27 million to Aboriginal-controlled projects in CED, business development capital and information services, tourism, forestry, telecommunications and youth internships.

Human Resources Development Canada Office of Learning Technologies (http://olt-bta.hrdc-drhc.gc.ca/about/index.html): The Office of Learning Technologies (OLT) works to raise awareness of the opportunities, challenges and benefits of technology-based learning and to act as a catalyst for innovation in the area of technology-enabled learning and skills development. The vision of the OLT is to "contribute to the development of a lifelong learning culture in Canada." Its mission is to "work with partners to expand innovative learning opportunities through technologies."

- *Community Learning Networks Initiative* (http://olt-bta.hrdc-drhc.gc.ca/contribu/index.html#cln): The Community Learning Networks Initiative (CLNI), launched in late 1998, supports time-limited pilot projects in partnership with community organizations that can offer multi-point access to a variety of learning resources within and across communities. These pilot projects may develop new models or enhance existing exemplary models that other communities can learn from, adapt, or build on in order to promote and increase access to learning opportunities enhanced by technologies. Project proposals should address key CLN components such as: the use of technologies as tools to support and enable learning and networking; a strong community participation or community control at the local level; and the promotion of individual and community development.

- *New Practices in Learning Technologies* (http://olt-bta.hrdc-drhc.gc.ca/contribu/index.html#cln): An HRDC Office of Learning Technologies funding program, the New Practices in Learning Technologies (NPLT) works with partners to expand innovative learning opportunities through technologies. Among its activities, NPLT provides support for projects that contribute to a better understanding of learning technologies and how to use and adapt them for adult learners at home, at work and in their communities. Projects should attempt to concentrate on testing, assessing and/or developing new models related to the use of innovative learning technologies in a variety of situations. Proposals must focus on adult learners and meet specific program themes, objectives and assessment criteria as described in the NPLT Guidelines and Funding Application dated April 2001.

SchoolNet (http://www.schoolnet.ca/home/e): SchoolNet's mandate is to continue to work with the provinces, the territories and the private sector to extend connectivity into the classrooms and connect all First Nations communities to the Internet by the end of fiscal year 2000–01. SchoolNet's learning resources include over 5,000 quality educational materials evaluated and approved by professional educators.

- *Computers for Schools* (http://www.schoolnet.ca/cfs-ope): Computers for Schools helps young Canadians gain greater access to computer technology in a learning environment so they can acquire the computer skills to succeed in a technology-driven economy and society. Computers for Schools also provides young Canadians with hands-on experience in computer repair at its network of workshops located across the nation.

- *First Nations SchoolNet* (http://www.schoolnet.ca/aboriginal): First Nations SchoolNet (FNS) gives First Nations communities the opportunity to use exciting new technologies by providing the schools in these communities with an affordable high-speed connection to the Internet via DirecPC™ satellite terminals. The Web site provides a list of First Nations schools, curriculum resources, an educator's circle, cultural resources, traditional teachings, and links to other Aboriginal organizations. All eligible schools (schools under federal jurisdiction) receive information packages on the program. Schools interested in participating must contact SchoolNet to make arrangements. Equipment is then sent to the schools, and contact is made with the closest Help Desk for assistance in supporting the installations. Funding mechanisms are also put in place to provide support for Internet access and long distance expenses (where applicable). For more information, call 1-800-575-9200.

- *GrassRoots Program* (http://www.schoolnet.ca/grassroots): The SchoolNet GrassRoots Program, together with its provincial, territorial and corporate partners, promotes academic, employability and computer skills for Canadian youth by

integrating information and communication technology into learning. The GrassRoots Program offers funding to schools for the creation of innovative and interactive learning projects on the Internet that:

- foster the acquisition of academic, employability and computer skills by Canadian youth;
- build unique and relevant Canadian content on the Internet;
- integrate information and communication technology into learning; and
- facilitate increased connectivity and training opportunities.

- *Library.Net* (http://www.schoolnet.ca/ln-rb): The purpose of Library.Net is to encourage the growth of these new roles and to help Canadian libraries connect to the information highway and to one another. This is a cooperative venture on the part of Canada's public libraries, library jurisdictions and agencies, librarians and Industry Canada.

- *Network of Innovative Schools* (http://www.schoolnet.ca/nis-rei/e): This unique HRDC Office of Learning Technologies project recognizes schools using information and communications technology (ICT) in meaningful and imaginative ways to improve learning. The Network helps to ensure that students, educators and community members are prepared for the challenges and opportunities of information and communications technology for learning. Members have exciting opportunities for professional development, mentoring, research, international projects and more, related to ICT. All Canadian schools are encouraged to apply for membership in the Network through the Web site.

- *News Network* (http://www.stemnet.nf.ca/snn/newsnn/index.html): SchoolNet News Network (SNN) is a cyber-school for writers and aspiring journalists, a multimedia publishing and broadcasting forum for their stories, and a resource centre for teachers. SNN is open to all K–12 students in Canada in both official languages.

- *Site Builders* (http://www.schoolnet.ca/builders/e): SchoolNet Site Builders is a SchoolNet Web resource designed to help Canadian schools build or improve their own Web sites. SchoolNet Site Builders provides tips and guidelines but mostly showcases great existing school Web sites. That way, schools can see what a school Web site can do, how it can look and what kind of information it can include. A dedicated SchoolNet Scouting Team seeks out the best Canadian school Web sites on the Internet.

- *Youth Employment Initiative* (http://www.schoolnet.ca/yei/e/index.html): By providing relevant, marketable work terms in schools and libraries, the program helps youth between the ages of 15 and 30 who are unemployed or underemployed high-school, college and university graduates with proficiency in information and communication technology (ICT) to acquire valuable employability skills that will enable them to secure longer term careers in technology. Telephone: 1-800-575-9200.

Smart Communities (http://smartcommunities.ic.gc.ca/index_e.asp): The program sets out the following objectives:

- to assist communities in developing and implementing sustainable Smart Communities strategies
- to create opportunities for learning through the sharing among communities of Smart activities, experiences and lessons learned
- to provide new business opportunities, domestically and internationally, for Canadian companies developing and delivering information and communication technology applications and services

Online Digital Divide Reports

The Dual Digital Divide—The Information Highway in Canada (http://olt-bta.hrdc-drhc.gc.ca/publicat): Published by the Public Interest Advocacy Centre (PIAC), 2000, the report suggests that it is highly unlikely that the digital divide will be overcome in the near future. It points out that in lower social classes connectivity remains low and, comparatively, the digital divide has widened since 1996.

Falling Through the Net (http://www.ntia.doc.gov/ntiahome/digitaldivide): The most recent of these reports of the U.S. Department of Commerce, National Telecommunications and Information Administration, *Falling Through the Net, Toward Digital Inclusion*, 2000, measures the extent of digital inclusion by looking at households and individuals that have a computer and an Internet connection. It suggests that groups that were traditionally digital have-nots are now making dramatic gains.

Online Digital Divide Resources (Web sites)

Acacia Initiative (http://www.idrc.ca/acacia): The objective of the Acacia Initiative is to foster international interest and involvement in using ICTs to support rural and disadvantaged community development, thereby increasing community access to information and communication.

Digital Divide Network (http://www.digitaldividenetwork.org): The purpose of the DDN is to facilitate the sharing of ideas, information and creative solutions among industry partners, private foundations, non-profit organizations and governments.

ECommons/Agora Electronique Project (http://www.ecommons.net/2001-1/english/main.phtml): The eCommons/Agora Electronique project aims to close the digital divide by building vital public space online.

KnowNet Initiative (http://www.knownet.org): The KnowNet initiative centres around using and propagating ICT models for creating an open system for recognizing, valuing, enriching and sharing local knowledge in parallel with human capacity-building efforts.

Online Education Resources (Web sites)

21st Century Teachers Network (Connecting Teachers with Technology) (http://www.21ct.org): The 21st Century Teachers Network (21CT) is dedicated to assisting K-12 teachers in learning, using and effectively integrating technology into the curriculum for improved student learning. 21CT seeks to empower teacher leaders by connecting them with people and resources that will assist in the creation of teacher-driven professional development programs.

ePALS (http://www.epals.com): ePALS is the world's largest online classroom community, connecting over 2.9 million students and teachers. A completely free service, ePALS provides members with the collaborative tools, ideas and community needed to communicate worldwide.

Global Learning Consortium (http://www.glc-cag.org/e/index.htm): The purposes of the Global Learning Consortium (GLC) site are: to further support the goals of each member's educational and learning technologies programs; to provide opportunity for technology transfers between members and support research and development cooperation in the area of learning technologies; and to encourage global openness and exchange of information to promote a knowledge-based 21st century global learning community where educators and students can learn at any time and from anywhere.

MarcoPolo (http://marcopolo.worldcom.com): The MarcoPolo program provides no-cost, standards-based Internet content, developed by the nation's content experts, for the K-12 teacher and classroom. Online resources include panel-reviewed links to top sites in many disciplines, professionally developed lesson plans, classroom activities, materials to help with daily classroom planning, and powerful search engines.

Schoolmaster.net (http://www.schoolmaster.net): Its mission is to develop self-sustaining online communities by combining interactive technologies with focused content in a rich, dynamic environment. The site teaches students how to use the Internet and critical applications such as e-mail, discussion and Web publishing. The service is hosted and managed on Schoolmaster.net's servers, thus allowing school IT budgets to be allocated elsewhere.

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